August 30, 1934

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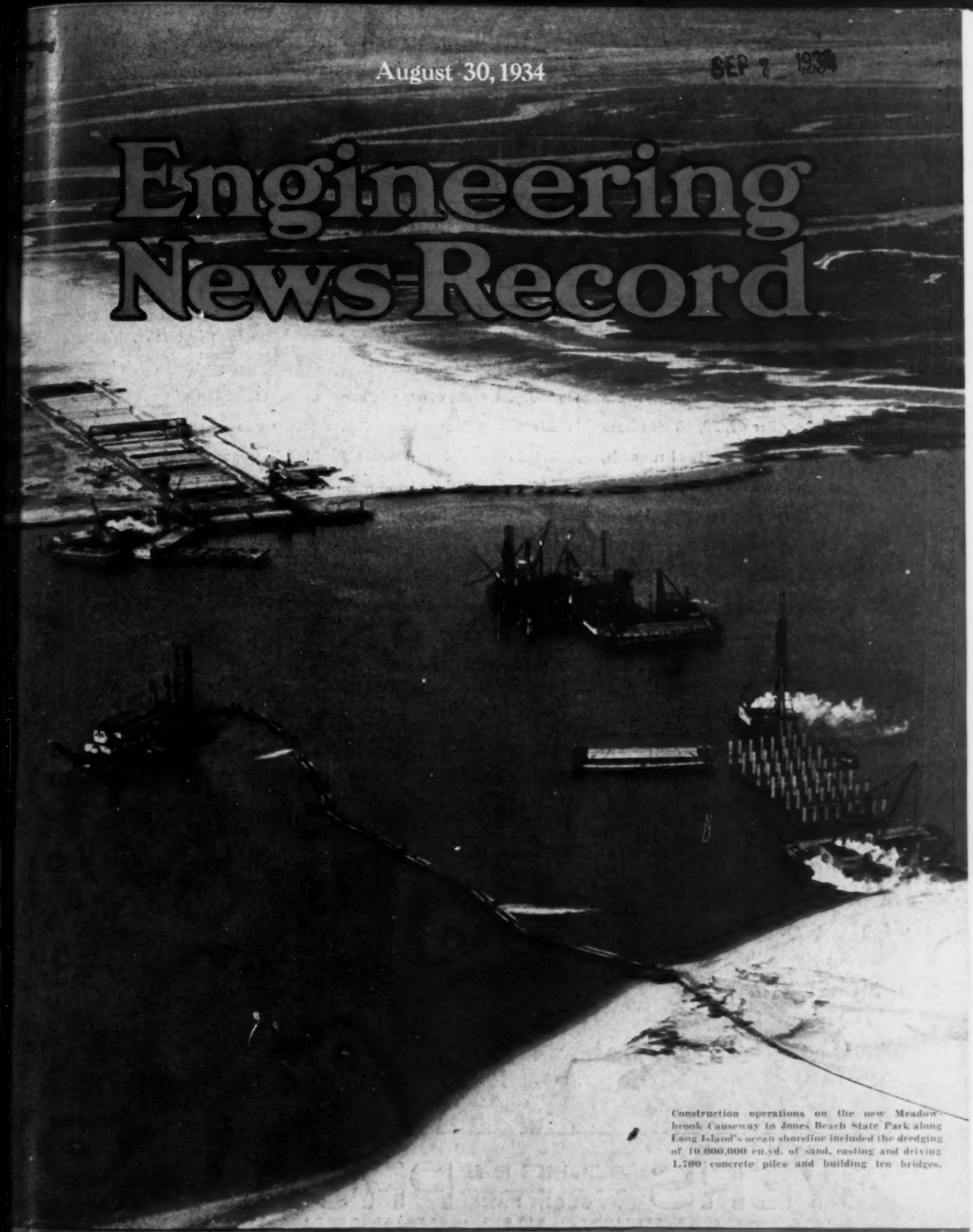
Engineering News-Record



Construction operations on the new Meadowbrook Causeway to Jones Beach State Park along Long Island's ocean shoreline included the dredging of 10,000,000 cu.yd. of sand, casting and driving 1,700 concrete piles and building ten bridges.

ARTICLES IN THIS ISSUE: A New Causeway Entrance to a Famous Beach Park . . . Russia's Rationalization Program for Future Construction . . . The Use of Steel Liner Plates in Undertrack Tunneling . . . Straightening the Mississippi River by Cutoffs . . . Building Two Large Earth Dams in Vermont

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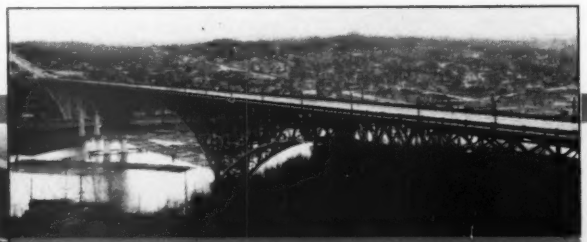
BYERS WROUGHT IRON ..in.. BRIDGE CONSTRUCTION

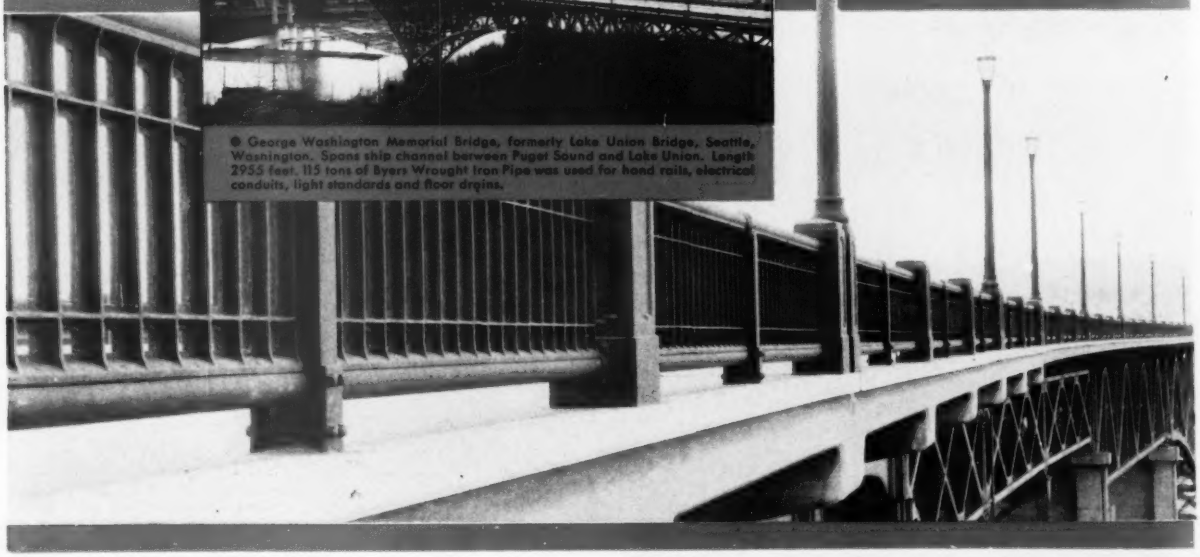
BRIDGE engineers are familiar with the interesting records of the wrought iron bridges still in service after 40, 50, 60 and more years. These unusual records, coupled with the fact that wrought iron plates, pipe, bars, rivets, shapes and angles are readily available, have focused attention on the use of wrought iron for those hard-to-maintain or corrosive places found in every bridge.

The result is that wrought iron today is playing an important part in bridge construction. Note the wide use made of wrought iron in this newest Seattle traffic link. A total of 115 tons of Byers Wrought Iron Pipe was used for hand rails, electrical conduits, light standards and floor drains.

Ask a Byers Engineer to show you photographs and blue prints of other recent bridge jobs where wrought iron has been specified for protection from locomotive blasts, corrosive drippings, etc. This interesting collection of material has been made possible through the friendly cooperation of many of the country's leading bridge engineers. Phone any Byers Division office or write our Engineering Service Department. A. M. Byers Company, Established 1864. Pittsburgh, Boston, NewYork, Philadelphia, Washington, Chicago, St. Louis, Houston, Los Angeles.



● George Washington Memorial Bridge, formerly Lake Union Bridge, Seattle, Washington. Spans ship channel between Puget Sound and Lake Union. Length 2955 feet. 115 tons of Byers Wrought Iron Pipe was used for hand rails, electrical conduits, light standards and floor drains.



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Only Two Cents, Mister

THE train stopped at Altoona. Through the railing that fenced the tracks a newsboy wailed his sales talk. And "wailed" is the word. "Paper mister? It's only two cents." To this appeal he added now and then: "Aw go on mister, why don't you buy a paper? It's only two cents."

During the five-minute wait no one bought. No one seemed to want a paper just because it cost "only two cents." For that particular news merchant, business was rotten.

But such selling is not confined to newsboys. It has its disciples even in big league circles. The price-only appeal is not unknown even in the realm of big business.

It is true that with certain commodities in some markets, price always will be a material factor. But a two-cent newspaper is not one of them. Neither are a lot more commodities that are offered with the newsboy's brand of salesmanship. A man buys a newspaper because he is interested in its contents—or thinks he is. If the boy's prospects thought that his papers really would interest them, they would have found the two cents. His true sales objective was their news- and reading-interest, not the cheapness of his product.

His papers may have been worthy but they never had a chance. He never presented their merits; he offered only a chance to spend something—a measly two cents—and he had no takers.

So with many another worthy product that is strangled today because, for one reason or another, the seller or the buyer or both are trading in prices rather than values. It is sad to see a producer who knows so little of his product, or thinks so little of it, that he suppresses its merits and sells only its price. It may be understandable, of course, for to a certain degree the seller must conform to conditions imposed by the buyer.

But the buyer's case is even more pathetic. For few buyers really can afford the extravagance of buying cheapness.

This is no defense of charging or paying two prices for what we may sell or buy. Neither does it advocate the purchase of value beyond our actual needs just because the value is there. That, too, would be extravagance, just as truly as buying more than we need because it is cheap.

This is merely an appeal to buyers to take account of value as well as price in what they buy. It is an appeal to sellers to sell the value of their product as well as its price. Good buying and good selling both require a sound balance between value and price. When one is emphasized at the expense of the other, some one is bound to lose.

One characteristic of depression business is a loss of this sense of proportion. Buyers tend to set an excessive value on their money and so belittle the ultimate value of what they buy. Unfortunately also, an abnormal share of public buying increases the relative volume of price-alone business. Sellers, reacting to the buyer's influence, are prone to concentrate on price and forget that they have anything else to sell.

Thus is generated a vicious spiral, in the course of which the goods get less and less of a chance for their lives.

One encouraging aspect of the times is that more buyers are beginning to take an interest in values and more producers are beginning once again to sell value. Indeed, we have heard complaints of late that prices have been increasing too rapidly. All that is significant. A year ago the question would have been: "How much are you cutting your price?" rather than: "How little are you raising your price?"

We still are a long way from sound buying and selling practice, but the wise producer, who reads the trends aright, now lays more and more emphasis in his selling on the value of the commodity or service he has to offer. He is moving out of the zone of "only-two-cents-mister" selling.

Willard Chevalier

ENGINEERING NEWS-RECORD

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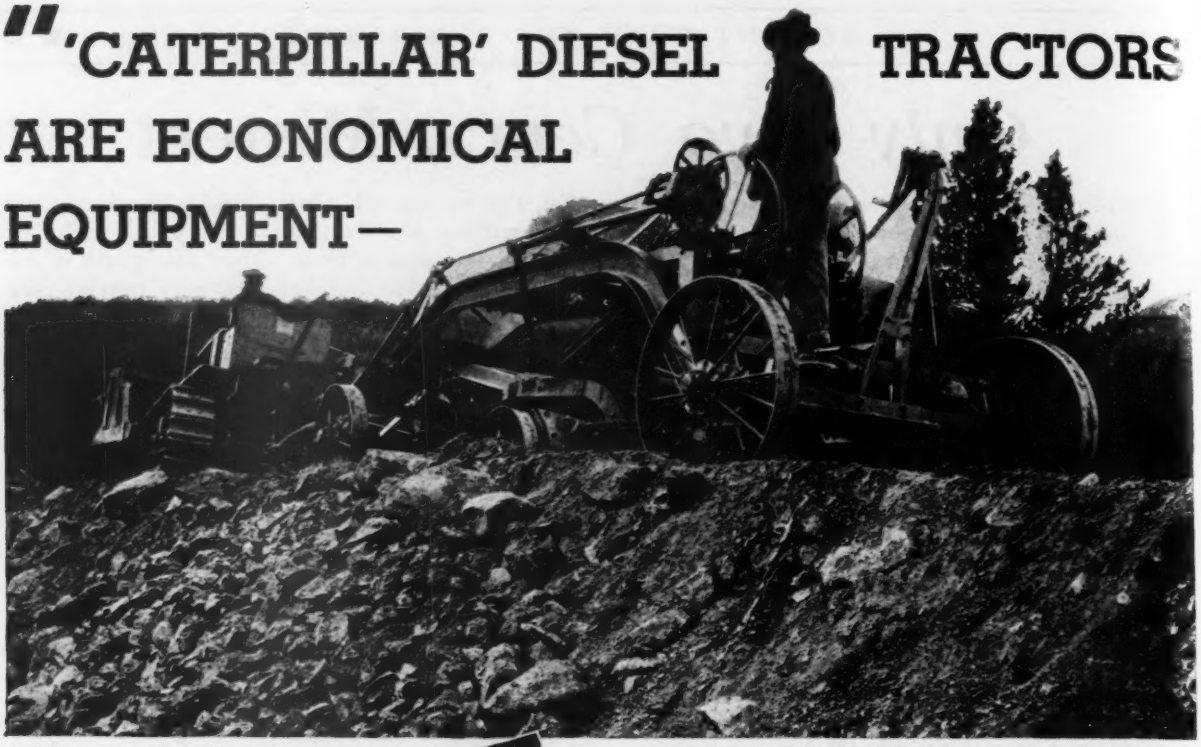
"'CATERPILLAR' DIESEL TRACTORS ARE ECONOMICAL EQUIPMENT—



Platt-Rogers Construction Company uses the economical "Caterpillar" Diesel — and a "Caterpillar" Grader—on this road-building job into Estes Park, Colorado.

THE MOST ECONOMICAL MANUFACTURED FOR USE IN EITHER BUILDING OR MAINTAINING ROADS," SAYS FLETCHER SENN, SUPERVISOR OF CALHOUN COUNTY, SOUTH CAROLINA

Building a new road in the state of Washington, near Seattle, three "Caterpillar" Diesel Seventy-Five Tractors are operating at a fuel cost for each tractor of less than 15 cents an hour.

AMERICA GOES DIESEL

Night and day, these "Caterpillar" Diesel Seventy-Fives serve Contractor D. McDonald on the Junipero Serra Highway construction job in California.

The "Caterpillar" Diesel story is spreading far and wide. Into the big construction camps. To road jobs of states, counties, townships. Into foreign lands. Wherever power users seek economy and dependable performance to bring them the advantage of lower costs.

With the economy of a full Diesel engine that operates on low-price fuel and less of it, "Caterpillar" has linked simplicity, ease of operation, endurance, sure starting. More than 3500 "Caterpillar" Diesels are now in use. Ask where you can see one at work. Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

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In the News:

CONTRACT to build Parker Dam on the Colorado River has been awarded to the Six Companies, Inc. The organization that is now pushing the Boulder Dam work to completion will attack the river at a new point. The $4,739,834 contract will provide a 340-ft. dam to form the diversion structure for the intake of the Colorado River Aqueduct.

THREE EUROPEAN HOUSING EXPERTS—two from England and one from Germany—are on an extended tour of Eastern cities under the auspices of the National Association of Housing Officials. They will confer with local agencies on low-cost housing and slum-clearance problems, giving them the benefit of European experience.

POWER UTILITY OFFICIALS throughout the country are filling out a "schedule of information"—otherwise, questionnaire—for the Federal Power Commission to provide data for the National Power Survey. The schedule is referred to as "comprehensive but without unnecessary questions."

PRIVATE CAPITAL, eager for an outlet, has bid higher prices than the PWA contracted to pay for bonds offered by St. Paul and Minneapolis to finance their joint sewage-disposal project, and as a result the PWA allotment has been reduced by $1,909,000. The PWA 4 per cent interest rate was cut to about 3½ by the prices offered by the private buyers.

THE CITY OF LOCKPORT, N. Y., has applied to the Federal Power Commission for authority to use water diverted from the Niagara River above the falls and transported to Lockport through the state barge canal for the development of power in a new municipal plant to be built with PWA funds. For several years the Niagara Falls Power Co. has used the water under a temporary permit.

In This Issue:

POPULAR DEMAND from increasing thousands of New Yorkers enjoying the Jones Beach development on the south shore of Long Island has resulted in a continuing construction program since the project was started in 1927. Approach facilities crossing five miles of tidal flats and inlets have been a major problem. The original entrance highway is already inadequate for week-end peak loads, and a second approach is nearing completion. Layout and construction of this $5,000,000 project are described by Sidney Shapiro, engineer in charge, with a brief review of the entire development.

POWER EQUIPMENT has largely replaced CCC hand-labor operations in building two earthfill flood-control dams on the Winooski River in Vermont, with obvious benefit to costs and morale.

UNDER THE GUIDANCE of the army engineers, the Mississippi River is busily at work cutting off about 70 miles of its length in a 265-mile section between the mouth of the Arkansas and the mouth of the Red River. The new principle of river control being employed was discussed at length in one of a series of articles on the Mississippi published last year. Progress on this work and the field methods used are outlined in this issue.

EVER-INCREASING SPREAD of electric transmission lines, combined with the development of reliable portable generating plants have greatly extended the possibilities of using electric power for construction operations. The principal uses and the equipment requirements are briefly reviewed in this issue.

IN CONCLUDING the group of three articles analyzing the Russian five-year plans, the author reviews the research program to develop local construction materials in various sections of the country, to help reduce the load on the transportation system in moving bulky commodities. The prospect of the second five-year plan is outlined.

BRIDGE FAILURES, from earliest historical times down to the present, have been caused by waterway openings insufficient to pass floods properly. Too-small openings result variously from poor hydrological data or from lack of coordination with other bridges on the stream. Central authorities, to pass on bridge waterways openings, such as exist in the Miami Conservancy District, are urged by C. H. Eiffert.

PRACTICES in utilizing pressed-steel liner plates in driving tunnels under railroad tracks are exemplified by three jobs completed last year in Palmer, Ind., Richmond, Va., and Dallas, Tex.

Coming Articles:

TO SIGNALIZE the annual meeting of the New England Water Works Association during the week of Sept. 17, our issue of Sept. 13 will contain a group of articles especially selected to illustrate the latest technical developments in the art of water supply. One of the articles will describe the program of improvements now under construction at Reading, Pa. This program touches almost every phase of waterworks practice. Purification plants will be represented by a description of the newly completed filter plant at Conneaut, Ohio, one of the first RFC-financed waterworks projects. The new pumping plant at Youngstown, Ohio, will serve to illustrate the most modern practice in pumping-station design. A number of consulting sanitary engineers will discuss recent developments in waterworks practice from the viewpoint of the engineer.

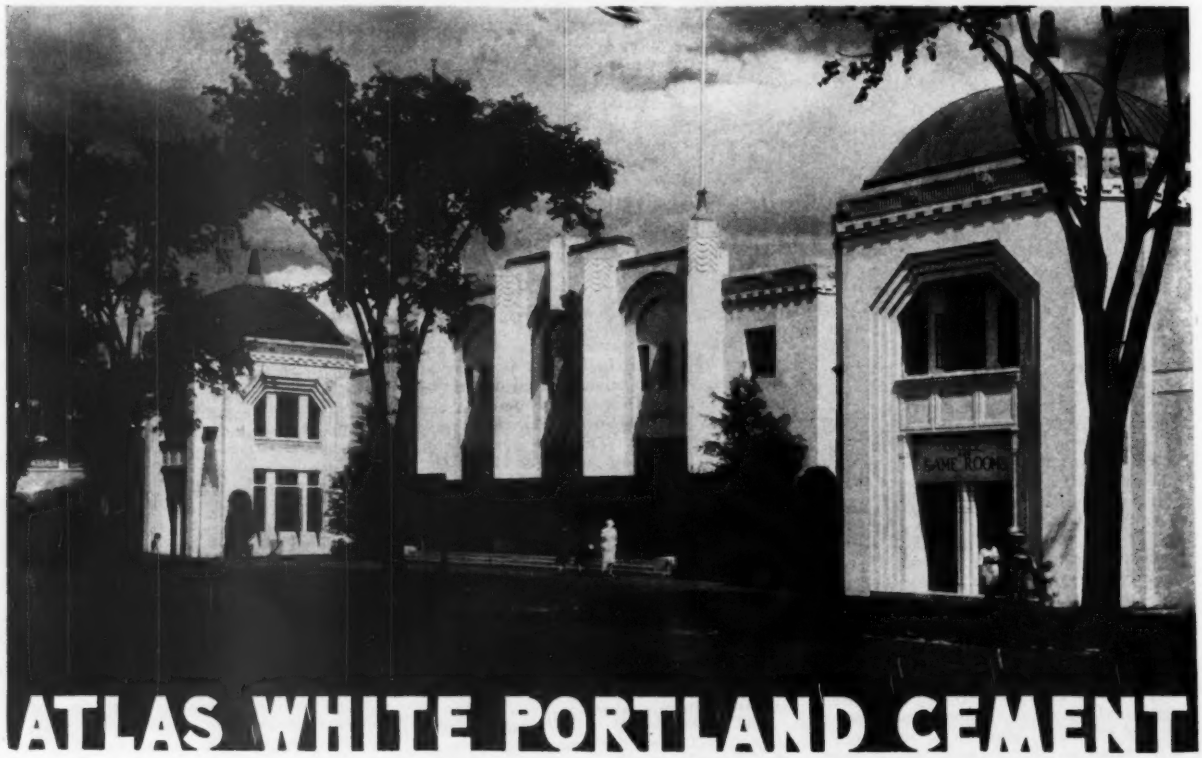
Stucco that grows old gracefully

These two structures, both in Playland Park, Rye Beach, New York, interest the eye as examples of stucco applied in "float finish." The *Artstone* stucco (a prepared stucco) is cream color, made with Atlas White plus pigment. As applied, it gives a monolithic concrete appearance to the exterior, and is, in fact, comparably sturdy and durable and weatherproof.

Not new, these buildings are proving that portland cement stucco, rightly made and applied, grows old gracefully. Weathering adds charm to the pleasant light colors possible with Atlas White. The stucco takes on a warm, weathered tone most pleasing against a background of trees and shrubs and green lawns.

Whatever the texture chosen and in any of the varied colors possible, Atlas White stucco makes an attractive and lasting exterior on almost any type of structure, new or old. You will be interested in the detailed information—write Universal Atlas Cement Co., *Subsidiary of United States Steel Corporation*, 208 South LaSalle Street, Chicago. 181

E. Gisonde, Inc., Mt. Vernon, N. Y., was the stucco contractor. Johnson and Miller, Inc., Yonkers, N. Y., were the general contractors. Walker and Gillette, N. Y. C., were the architects. Artstone Rocor Corp., Brooklyn, furnished the stucco.



ATLAS WHITE PORTLAND CEMENT

ENGINEERING NEWS-RECORD

August 30, 1934

FIG. 1—TEN MILLION YARDS of white sand fill provide the roadbed for the new Meadowbrook Causeway and the branch to Long Beach. View looking from Jones Beach toward the mainland.

A New Causeway Entrance to a Famous Beach Park

Jones Beach State Park on the south shore of Long Island to be served by 7½ miles of new access road built on 10,000,000 cu.yd. of hydraulic fill dredged from new boat channels—Design and construction of pavement, bridges and intersections

By Sidney Shapiro
In Charge of Engineering, Long Island State Park Commission, Babylon, L. I.

PROGRESSING one step farther in the development of Jones Beach State Park, New York's state-owned and operated oceanfront resort on the south shore of Long Island, the construction of an additional vehicular causeway to the popular recreational center is rapidly nearing completion and will be opened to traffic about the middle of October. This project is being built by the Long Island Park Commission, acting as a Causeway Authority, financed through a $5,050,000 RFC loan obtained in April, 1933. The causeway provided by this financing extends from Jones Beach to Merrick Road near the village of Freeport and, in addition, includes a branch line to Long Beach, the oceanfront community to the west, on the opposite side of Jones Inlet (Fig. 2). Beyond Merrick Road, the causeway is being extended northward to a connection with Southern State Parkway by the state department of public works.

When the Long Island State Park Commission in 1927 undertook the development of the obscure outer reef known as Jones Beach, the 17-mile-long, half-mile-wide strip of sand and marsh was inaccessible, save to the occasional fisherman poling his boat through the maze of shoals in the bay between the beach and the mainland. Except for a few isolated groups of fishing shacks and cottages, the island was uninhabited. Jones Inlet and Fire Island Inlet bordered the strip of beach at its west and east extremities, respectively; a new inlet had been cut through at Cedar Island; and at frequent intervals along the entire length of the reef, periodic overflow occurred during Atlantic Ocean storm tides. High water on the Great South Bay side of the island was also responsible for considerable sand erosion and displacement.

The ownership of the land rested in the townships in which it was located. With the goal in view of establishing an

oceanfront park within 30 miles of New York City, the commission secured, by vote of the townspeople, the control of the land, with the result that over 6,000 acres of beach and meadowlands have been turned over to the state for park development.

Today, a wide motor causeway runs across the marshes from the mainland of Long Island at Wantagh, making Jones Beach accessible to the recreation seeker. On the beach itself, a wide Ocean Parkway is complete for the 17 miles of beach. Bathhouse accommodations for 15,000 persons are available in monumental brick and stone structures. Restaurants, swimming pools, a mile-long boardwalk and 76 acres of concrete parking fields are among the principal features already provided. Besides the Atlantic Ocean surf available for bathing purposes, an artificial still-water bathing beach has been established on the bay side. A 17-mile-long boat channel borders the development on the north. Fig. 2 shows the general plan. The construction improvement at Jones Beach State Park today represents a cost of $15,000,000. Last year the park was host to 3,200,000 visitors.

Geology and topography

The outer beach of the south shore of Long Island, except at the east end, is made up of a series of long narrow sand reefs, separated at intervals by ocean inlets. The easterly beaches are principally gravel headlands, resulting from glacial deposits. The littoral movement carries sand steadily from the east to the west, resulting in a constant growth of the west end of the individual spits into the bordering inlet, with a consequent gnawing away of material on the opposite bank of the inlet. At the same time the shoreline along the ocean is alternately driven back during periods of erosion and extended into the ocean during periods of accretion.

Important factors governing the selection of the routes of the Ocean Parkway and of the connecting causeways to the mainland, as well as the location of the structures on the beach, were the behavior of these inlets and their connecting waters and the characteristics of the beach itself. During the preliminary investigations of the project, studies were made of the U.S.C.&G.S. shoreline maps of Jones Beach, dating as far back as 1834. Predictions as to the behavior of the beach were made, based on the relative shoreline positions during this 100-year period. Fig. 3 shows the progressive periods of beach erosion and accretion from 1834 to the present. Safety of the beach lies in the fact that the buildings and structures are located a sufficient distance back of the stormwater line and that the original dunes have been left intact, thus acting as a natural protective barrier.

Jones Beach State Park

JONES BEACH is the only large public beach of its kind in the metropolitan district which thus far has no need of protective jetties or groins. It should be added that outside of the heavily developed areas of the park the Ocean Parkway has been located at a sufficient distance back of the shoreline so that the natural bluff of high dunes has been preserved between the parkway fill and the beach proper. Additional safety is afforded by reason of the 1-on-30 hydraulically placed sand slopes on each side of the paved roadway. During storm periods the action of waves rolling up these gentle slopes is largely dissipated. Moreover, these side slopes cause the roadway, constructed at an elevation of 14½ ft. above sea level, to blend in with the surrounding sand dunes, giving the parkway fill the appearance of a natural ridge, rather than an artificially placed embankment.

The first causeway

Construction of the first Jones Beach Causeway, originating at Wantagh, began late in 1927; it was opened to traffic in the summer of 1929. The section is 5 miles long and consists principally of a hydraulic fill connecting the group of islands along the route, with bridges over each of three navigable channels. The bridges are of concrete-pile-bent construction and were built at a cost of about $5 per sq.ft. Typical design details, showing the 24-in. concrete-pile bents, with concrete caps, beams and deck, are shown in Fig. 6.

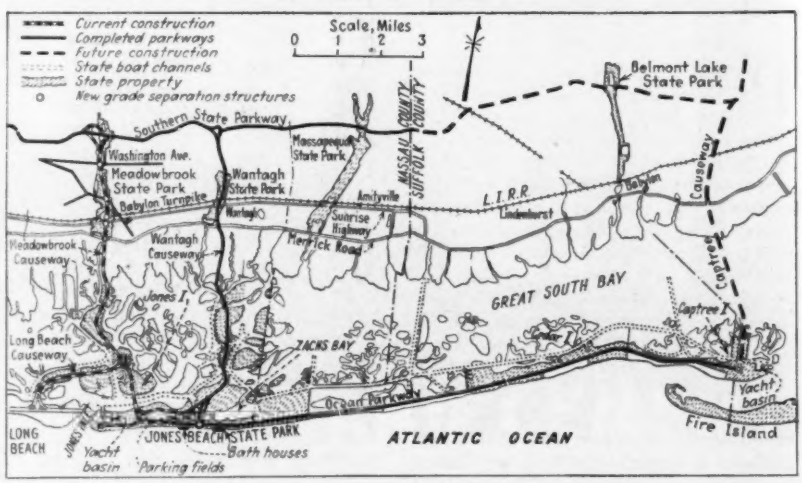
The first bridge, nearest the mainland, is 100 ft. long, with a vertical clearance of 15.6 ft. at low water. The next bridge, crossing what was then the principal boat channel, is 520 ft. long between abutments, and is provided with a 75-ft. clear-span, four-leaf, underneath-swinging-counterweight-type bascule bridge, with a clearance when closed of 23.6 ft. above low water. The third bridge is 575 ft. long, fixed, and at the center has a clearance of 17.6 ft. above low water. The average tide range at these bridges is about 3 ft. All bridges provide for a 60-ft. roadway and two 5-ft. walks. The present pavement on the causeway proper is 40 ft. wide, with provisions for future widening to 60 ft. The total cost of constructing the causeway was about $1,900,000. Details of construction and of structure design closely parallel those involved in the causeway now under construction, outlined below.

Ocean Parkway

At the terminus of the causeway on the outer beach, a 150-ft.-diameter traffic circle affords an intersection with the Ocean Parkway (Fig. 4), which extends the full 17-mile length of the beach. The parkway pavement, of 8-in. reinforced concrete, ranges in width from 40 to 80 ft., depending on the intensity of the development through which it passes. Built on a hydraulic fill, 14½ ft. above sea level, the parkway is provided with ten underpasses, at intervals, to permit the passage of pedestrians from one side of the roadway to the other.

Concrete for the parkway pavement is a 1:1¼:3½ mix. In laying this pavement the hydraulic sand-fill subgrade was sprinkled with as much water as it would readily absorb. Then, instead of

FIG. 2—JONES BEACH STATE PARK, on a barrier beach along Long Island's ocean shore, is connected with the state parkway system on the mainland by two causeways; and a third, at the east end, is proposed. Note also the state boat channels formed by dredging for highway fill.



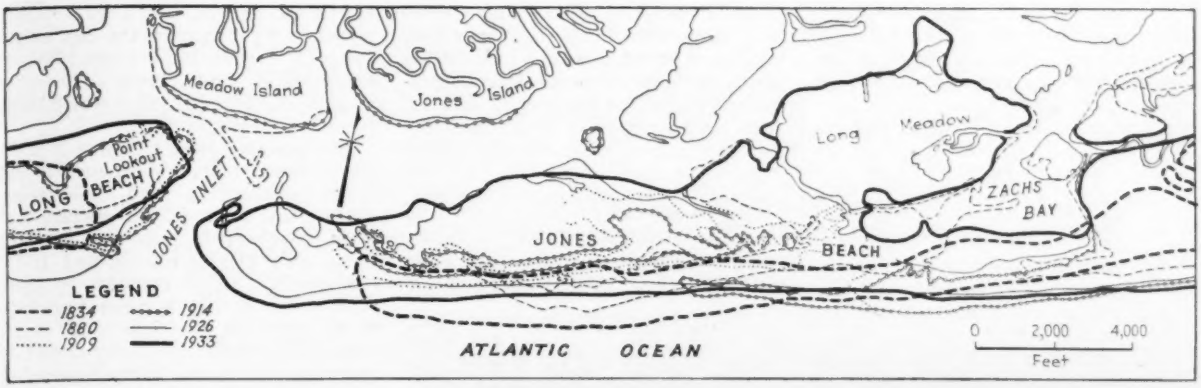


FIG. 3—ONE HUNDRED YEARS of shoreline changes by wave erosion and drift accretion along Jones Beach and Long Beach.

following the usual procedure of rolling the subgrade with heavy rollers, the concrete was deposited on the moist material in successive batches. The pavement was laid in sections 10 ft. wide and 78½ ft. long, separated transversely by a ¾-in. premolded bituminous joint. The concrete was cured by applying a bituminous emulsion to the pavement surface immediately following the finishing operations. After the work on the contract was completed and before the job was turned over to the commission for final acceptance, a second emulsion application was applied, to eliminate sun glare and provide a dark-colored pavement.

Parking fields and structures

Branching off from the Ocean Parkway are the concrete parking fields, totaling 76 acres in extent. The slabs are 5 in. thick, lightly reinforced, with transverse and longitudinal expansion joints of ½-in. premolded bituminous material every 40 ft. Preparation of subgrade and the methods of pouring and curing the concrete were the same as for the construction of the main 8-in. parkway pavement.

The west bathhouse is a brick and stone structure with accommodations for 5,400 bathers. Within it are swimming and wading pools and a restaurant. The swimming pool is 100 by 150 ft., contains 620,000 gal. of water, and is illuminated by a system of underwater lighting for night bathing. The children's wading pool is 50 by 100 ft. and contains 95,000 gal. The pools are supplied with sea water through a series of screened well points located at the edge of the surf, 600 ft. south of the building. The water is filtered and chlorinated. The east bathhouse, also of brick and stone, with facilities for 10,000, is convenient to both ocean and bay bathing beaches. Both bathhouses are founded on cast-in-place concrete piles, averaging 16 ft. in length and designed for a working load of 20 tons and a safe load of 40 tons.

Along the ocean beach, extending from one bathhouse to the other, is a mile-long 40-ft.-wide boardwalk. Yellow pine piles jetted and driven to safe penetration, capped with 4x14-in. floor beams, support 3x10-in. stringers and a deck laid with 2x4-in. vertical-grain fir. A heavy ship's rail on pipe stanchions borders each edge of the boardwalk. Cost of the structure was about $1 per sq.ft.

FIG. 4—NUCLEUS of present Jones Beach development is the traffic circle at the water tower where the Wantagh Causeway intersects Ocean Parkway. Bathhouses at either end of developed area are connected by a mile-long boardwalk. Note swimming pool in bathhouse in right foreground. Parking fields at left total 76 acres.

Fresh water is supplied by two 1,000-ft.-deep wells equipped with turbine pumps capable of delivering a total of 1,700 g.p.m. to a 300,000-gal. steel standpipe. The wells operating individually by a float switch control at the standpipe force the fresh water to the tank through a 12-in. cast-iron line with a minimum of 4 ft. of sand cover. The water at the present time is being aerated by discharging the flow into the tank at the top. A deferrization plant is now under construction.

The standpipe is 200 ft. high surrounded by a brick and stone enclosure carried on structural-steel framing. Located in the traffic circle at the intersection of the Wantagh Causeway and Ocean Parkway, it is visible both from the mainland and from the transatlantic steamship lanes, and has become a landmark already widely known.

Boat channel

Bordering the entire development on the north, from Jones Inlet to Fire Island Inlet, is the state boat channel (Fig. 2). Thirty-five million cubic yards of fill were removed from the marsh and meadow in the path of the channel, the material being used for the reclamation of the tidal lands developed. With connecting cross-bay channels and feeders from the the principal villages along the route, there is, in all, an aggregate of 26 miles of state-constructed deep waterway in the Jones Beach channel system. The minimum main-channel depth at low tide is 15 ft., with

a bottom width of 200 ft. Contract prices for the dredging ranged from 6 to 14 c. per cu.yd., varying with the length of pipe line required and volume of fill to be placed.

Channel markers, consisting of 12-in.-diameter creosoted timber piles, driven to 20-ft. penetration, to resist ice uplift, have been placed along the route of the new waterway. Directional signs, indicating mileages to the various harbors, have also been erected.

The New Causeway Entrance

CURRENT construction at Jones Beach was made possible through a $5,050,000 loan obtained in April, 1933, from the Reconstruction Finance Corp. The principal feature of the new project is the construction of an additional causeway (4 miles long) to the park from the mainland, 5 miles west of the present causeway, with a branch spur from Long Beach, 2½ miles long (Fig. 5). In addition, the loan provided for the construction of 2¾ miles of pavement at Jones Beach, furnishing a connection between the new work and the existing Wantagh Causeway, as well as for the repaving with concrete of 4 miles of the latter causeway. Seventeen acres of parking fields were also included.

Ten bridges are now under construction on the causeway proper, including two bascule spans with approach trestles, four fixed bridges, all over navigable channels, and four elliptical-arch grade-separation structures at the various parkway intersections. A secondary-road system for the purpose of bypassing parking-field traffic in the highly developed section of the park is also under construction. This new work will be completed in October. Details of the project follow.

Dredging

Within one week of the approval of the RFC loan in Washington, the first contract was let for the placing of 10,000,000 cu.yd. of hydraulic fill for the causeway roadway foundations. By pumping the fill material from the alignment of new extensions to the boat-channel system (Fig. 7), which is general paralleled the new causeway, channel and roadway work were efficiently coordinated. The work was completed in eight months, the best output being in August, 1933, when 1,700,000 cu.yd. of fill were placed within payment lines. The bid price was $0.078 per cu.yd. in place.

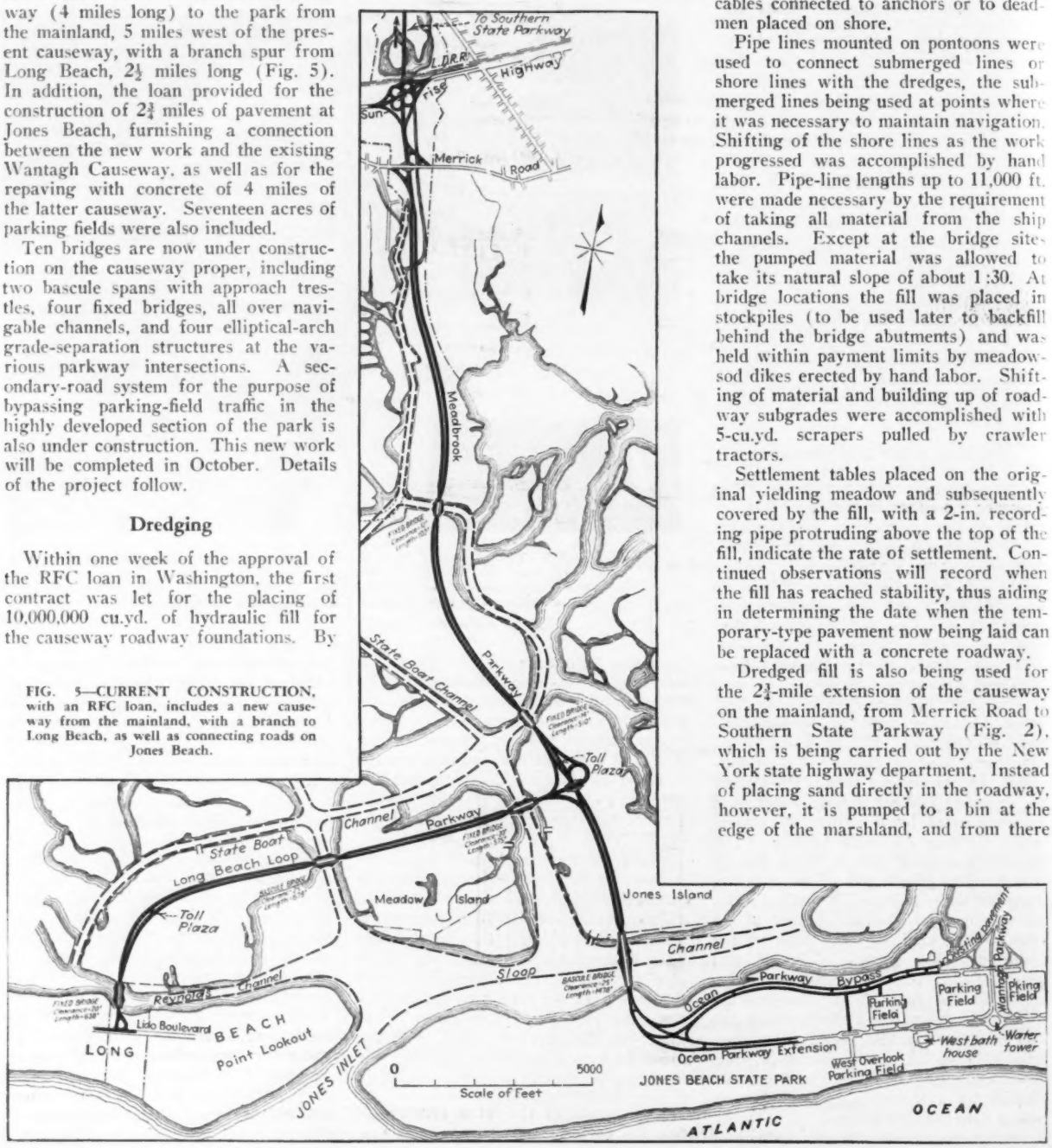


FIG. 5—CURRENT CONSTRUCTION, with an RFC loan, includes a new causeway from the mainland, with a branch to Long Beach, as well as connecting roads on Jones Beach.

The dredging plant consisted of three diesel-electric units (34-in. suction and 27-in. discharge), two oil-burning steam-plant units (27-in. suction and 24-in. discharge), and one soft-coal steam unit (18-in. suction and 15-in. discharge). These dredges, equipped with cutter agitators, were towed to their respective positions and thereafter propelled themselves by means of their rear spuds and by their swinging cables connected to anchors or to deadmen placed on shore.

Pipe lines mounted on pontoons were used to connect submerged lines or shore lines with the dredges, the submerged lines being used at points where it was necessary to maintain navigation. Shifting of the shore lines as the work progressed was accomplished by hand labor. Pipe-line lengths up to 11,000 ft. were made necessary by the requirement of taking all material from the ship channels. Except at the bridge sites the pumped material was allowed to take its natural slope of about 1:30. At bridge locations the fill was placed in stockpiles (to be used later to backfill behind the bridge abutments) and was held within payment limits by meadow-sod dikes erected by hand labor. Shifting of material and building up of roadway subgrades were accomplished with 5-cu.yd. scrapers pulled by crawler tractors.

Settlement tables placed on the original yielding meadow and subsequently covered by the fill, with a 2-in. recording pipe protruding above the top of the fill, indicate the rate of settlement. Continued observations will record when the fill has reached stability, thus aiding in determining the date when the temporary-type pavement now being laid can be replaced with a concrete roadway.

Dredged fill is also being used for the 2¾-mile extension of the causeway on the mainland, from Merrick Road to Southern State Parkway (Fig. 2), which is being carried out by the New York state highway department. Instead of placing sand directly in the roadway, however, it is pumped to a bin at the edge of the marshland, and from there

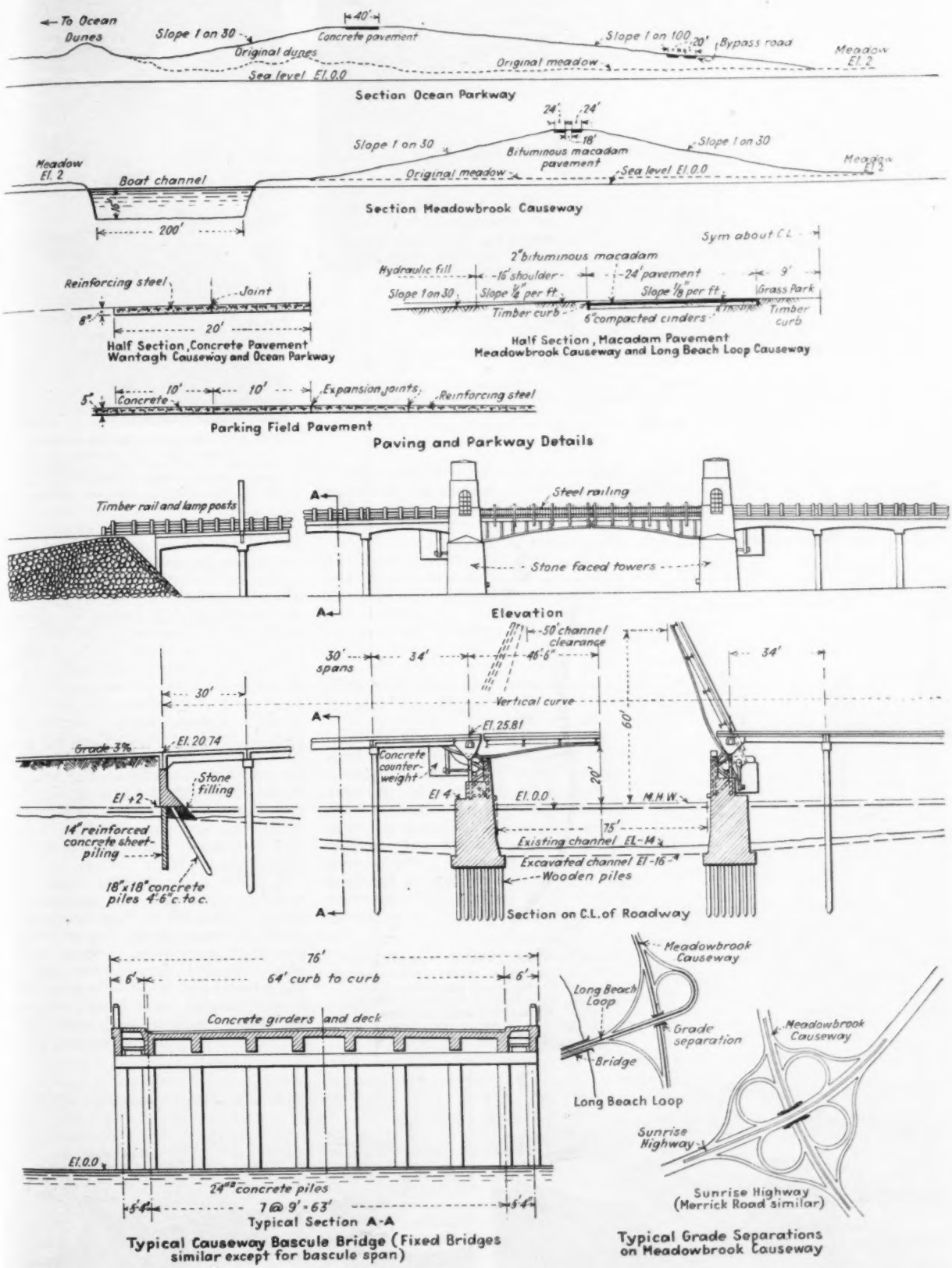


FIG. 6—TYPICAL SECTIONS AND PLANS FOR PARKWAYS, CAUSEWAYS AND PARKING FIELDS AT JONES BEACH STATE PARK

FIG. 7—CONSTRUCTION OPERATIONS on the new Meadowbrook Causeway. View shows Sloop Channel bridge under construction and one of the dredges pumping sand from the boat channel into roadway fill on Jones Beach. Pile-casting yard is in background where the 1,700 piles for ten bridges were made.

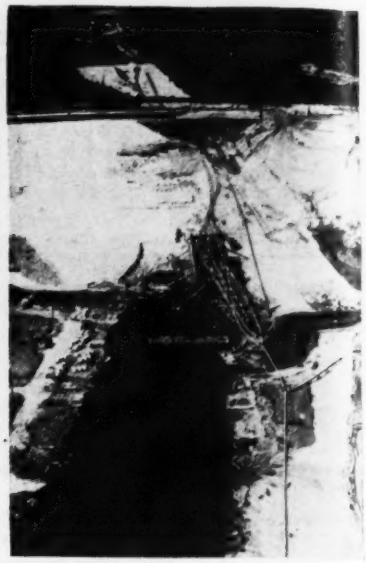


FIG. 8—SAND BIN at Merrick Road into which dredges pump fill material for the extension of the road north to Southern State Parkway. Sand is hauled from the bin to fill locations over an industrial railway.

it is hauled by industrial railway to the fill locations. A view of the bin set-up is shown in Fig. 8.

Bridge work

The next large contract let was for the construction of the six channel bridges, excluding the bascule spans and piers. Work under this contract involved the casting and driving of 1,726 concrete piles, including 24-in. square piles up to 95 ft. in length, 18-in. batter piles, and sheetpiles for the bridge abutments. The mix used was 1:1½:3, with 3,500-lb. concrete required. Steel reinforcing for piles consists of bars up to 1¼ in. square, bound with ⅜-in. steel ties. Additional work under this contract consisted of the erection of the shore abutments of the six bridges; capping of the pile bents; construction of concrete beams and decking; and completing the structures with guard rail, lighting, etc.

The contractor initiated operations with the casting of 24-in. square test piles, using high-early-strength cement. Water loads up to 110 tons, measured in a calibrated water tank, were placed on top of each test pile, and the pile tested for settlement. This is twice the load the piles are expected to carry in the structure. In general, the design allowance of 500 lb. per sq.ft. of frictional resistance through sand was found adequate.

Immediately after the tests were completed, casting of piles was started in a yard set up on Jones Island (Fig. 7), with water delivery of materials. A gantry crane conveyed the concrete from a floating mixing plant to the pile forms, subsequently carried the cast piles to the curing yard, and eventually loaded a scow with piles, to be towed to the piledriver.

The main piledriver was equipped with two 4-in. jets, 100-ft.-high leads and a *00* double-acting steam hammer. In raising the concrete piles from the scow into the leads bridles were utilized, fastened to the pile at points not over 20 ft. apart, and arranged to provide the same bearing at all points of contact. Under this method of handling, stresses in the reinforcement were never in excess of 12,000 lb. per sq.in., allowing 100 per cent of the calculated load for impact and shock effects.

The six bridges are 102, 510, 575, 638, 678 and 1,478 ft. long, respectively. The length at each bridge was determined by the width of the original channel between banks, on the assumption that any constriction in width might ultimately invite an errosive action tending to scour at the abutments. Bents are on 32-ft. centers. Over-all widths are 54 ft. on the Long Beach Causeway and 70 ft. on the Meadowbrook Causeway, the mainland connection. The bridges of the Meadowbrook Causeway are designed to provide for six lanes of traffic as against four lanes on the Long Beach Causeway, due to heavier anticipated traffic.

With the piling in place, deck construction was begun by casting cap beams. Holes left in these beams provided for hanger details that supported temporary longitudinal I-beams upon which the deck forms were erected. The I-beams and forms were assembled in span lengths on a barge equipped with head frames at each end. The barge was then maneuvered into posi-

FIG. 9—ROADBUILDING operations on the new causeways. (Left) 5-yd. scraper hauling fill for bridge approach. (Right) Rolling cinder base for bituminous wearing surface. In this view note settlement-table rods sticking up between roadways, also pile-casting yard in right background.

tion under the bridge and the forms hoisted, by falls attached to the head frames, to the deck location, where the I-beams were connected to the hangers. Concrete was mixed in a floating plant and pumped into the forms. When one span was completed, the head-frame barge transferred the I-beams and forms to the next span.

Work on the two bascule bridges is progressing simultaneously with the pile-bent construction. A steel sheet-pile cofferdam was framed, for each of the four piers, around a timber crib that had been previously sunk into place. Timber bearing piles, approximately 50 ft. long, were driven below the bottom of the pier. After the interior of the cofferdam was excavated to the required grade, the site was kept dry by means of a well-point system and pumps. Concrete was then poured in successive lifts. The above-water portions of the concrete piers are to be faced with granite.

Erection of the trunnion posts and main girders for the bascule leaves was by derrick boat. Counterweights are of concrete, with final adjustment to be accomplished by means of small concrete blocks. Fig. 6 shows an elevation of a bascule and approach trestle. All abutments rest on creosoted timber piles designed for a 20-ton working load and a 40-ton safe load. Superstructure design provides for an H-20 live load. Concrete strength was specified at 3,500 lb.

Contracts for grade-separation structures at Jones Beach, Short Beach, Jones Island and Merrick Road have also been let by the Causeway Authority. In addition, the state department of public works is building grade-separations at Sunrise Highway, the Long Island R.R., Babylon Turnpike, Washington Ave. and Southern State Parkway. With two exceptions, all of these are the conventional grade-separation scheme adopted by the Long Island State Park Commission, involving a stone-faced, single-span, elliptical-arch, concrete bridge with a clover-leaf access drive arrangement. The two exceptions occur at Sunrise Highway, where a two-span bridge is used, since the underpass road is in two separated lanes, and at the Long Island Railroad, where a steel-plate-girder structure with stone-faced abutments is utilized.

Due to the settlement of the fill, which is expected to continue for four or five years, the roadway pavement now being laid between bridges is of a temporary type, non-rigid design. It consists of a 6-in. compacted-cinder base, topped with 2 in. of pre-mixed macadam surfacing. The roadway is of twin-pavement design, with a landscaped panel for the dividing strip (Fig. 5). Beach grass will be planted to hold the side slopes of the sand fill, but for the present recourse must be had to sand fences to keep drifts from burying the pavement (Fig. 10).

FIG. 10—GRADE-SEPARATION bridge under construction at intersection of Meadowbrook and Long Beach Causeways. Widened pavement beyond bridge is toll-booth plaza. Note sand fences along roadway.

The $5,050,000 loan is to be repaid out of revenue derived from tolls to be collected from vehicles using the causeways, all a part of a self-sustaining, self-liquidating project. Estimates of anticipated traffic indicate that the loan can be amortized within 25 years. The establishment of the toll will not be a burden to the users of the beach, inasmuch as the parking fee at Jones Beach will be reduced from 50 to 25c., thus making the total charge the same under the proposed plan as it is today.

Completion of work under the present RFC project will round out the development of Jones Beach as far as its westerly entrances are concerned. At the easterly extremity of the long narrow beach, however, still another connection with the mainland will be built. This is the proposed third causeway, from Captree Island Beach to the mainland, near the village of Babylon. Incorporated within the Captree Causeway will be a 7,900-ft. long structure over the Great South Bay, with the middle 1,600 ft. occupied by a suspension bridge.

On the mainland the Southern State Parkway is being extended, connecting the approaches to the westerly causeways with the Captree Causeway entrance. When this is accomplished, a continuous parkway, 45 miles long through parks and along ocean and bay, will be available, without a single intersection at grade.

Robert Moses is president of the Long Island State Park Commission, and Arthur E. Howland chief engineer and general manager. The project is under the supervision of the writer. C. C. Combs is landscape architect.

Removal and Salvage of old Submarine Water Pipes Under the First Narrows at Vancouver

SIX LINES of cast-iron submarine water conduit under the First Narrows of Burrard Inlet, Vancouver, B. C., are being removed and salvaged by the engineering department of the Greater Vancouver Water District under the direction of E. A. Cleveland, chairman, and W. H. Powell, engineer of the District. These mains, which until recently carried to the city the water taken from Capilano River, one of the city's two supply sources, include four lines of 18-in. and two lines of 12-in. pipe about a quarter mile long, which range in age from 10 to 40 years. (See a description of the laying operations by Charles Brakenridge, *ENR*, Sept. 2, 1926, p. 366.) They were taken out of service recently upon completion of a 7½ ft. rock-tunnel siphon line, whose construction was undertaken immediately after a steamer collision resulted in breakage of four of the six submarine pipes, an event that made the exposed situation of the city's water-supply lines clearly evident. Previously the pipes had been damaged at various times by fouling anchors, and numerous repairs had been carried out because of such damage.

The pipes have flexible joints formed by seating the grooved spigot end in spherical-segment bells by means of a poured-lead spherical seating ring. In the larger pipes the weight of the lead in each joint is about 300 lb. The value of this lead is expected to cover the cost of the removal, whose purpose is both salvage and the provision of employment. In addition to the lead, the pipes themselves have a considerable salvage value, since, except for some inside tuberculation and outside erosion of a few of the lengths by leakage jets and by gravel shifting with the tidal currents (which here run at six to eight knots), the pipes are still in excellent condition and can be used in other crossings. They have a wall thickness of about 1½ in., and the six lines contain nearly 2,000 tons of iron, which originally cost $55 to $65 per ton. As the pipes are pulled out, erosion, corrosion and tuberculation are carefully noted.

The city has a second water supply from Seymour Creek, several miles east of Capilano River. This is brought in by a group of smiliar submarine mains under the Second Narrows, about 4 miles up the inlet. As this crossing is less exposed to damage than was the old First Narrows line, replacement by a tunnel has not been undertaken.

Shovels and Trucks Rush Earthfill On Winooski Flood-Control Dams

Construction operations in Vermont by CCC completely Mechanized following winter season of hand labor— Concrete diversion conduits built during cold weather

UNDER completely mechanized construction operations rapid progress is being made in the placing of fill in the two earth dams being built as part of the Winooski River flood-control project in northern Vermont. If good weather prevails up to December 1 major work on both structures will be completed this year. Construction started just a year ago on these projects, one a 1,140,000-cu.yd. dam on North Branch at Wrightsville, the other an earthfill of half that yardage on Jail Branch at East Barre. (*ENR*, Nov. 9, 1933, p. 551). Both dams were designated to be built by CCC labor units of war veterans under the direction of the Corps of Engineers. In addition to the two dams considerable work was done with CCC labor in widening Middlesex Gorge on the Winooski River and in cleaning out debris and widening the channel at other points to permit unrestricted floodflows. Furthermore, the government was willing to rebuild several dams on the river owned by private industries. These dams had insufficient spillway capacity and created a flood hazard. The ownership, in each case, was to be transferred to the city in which the dam was located. The title to only one of these, that of the U. S. Clothespin Co. at Montpelier, has been transferred to the city to permit federal reconstruction.

The article published last November described the comprehensive flood-control scheme for the protection of the Winooski River Valley, of which the Wrightsville and East Barre projects are two of seven reservoirs planned. The design of these two dams and early difficulties in organizing some 5,000 green recruits into a semblance of an efficient construction force were also described. From the start, the U. S. Engineers were faced with the problem of coordinating hand-labor methods with mechanical operations to insure satisfactory progress of work.

Shortly after the thousands of war veterans comprising the CCC units had arrived at the site of the two dams last summer, armed with shiny new picks, shovels and wheelbarrows but with very little ambition, authorities in charge began to supplement quietly hand-labor operations with power equipment. Under carefully worked out plans of keeping the labor squads working to the limit of their aptitude and the other equipment to its utmost efficiency, both sites by winter had been cleared and stripped and the diversion channels excavated.

Winter work

During the severe winter months certain items of the work carried on were such that the men performed really effective work. The size of the force, however, varied almost daily due to changes in enlistment and to the large number of men assigned by camp commanders to work not directly connected with the flood-control projects, making it difficult to plan schedules or to hold to them. At both dams the concrete-box diversion conduits were built during cold weather. The men took well to concrete work as being of more interest and more indicative of definite

FIG. 1—PAVED diversion channel at East Barre dam built by CCC labor during winter months. Sides and bottom of channel are paved with granite blocks packed with concrete.

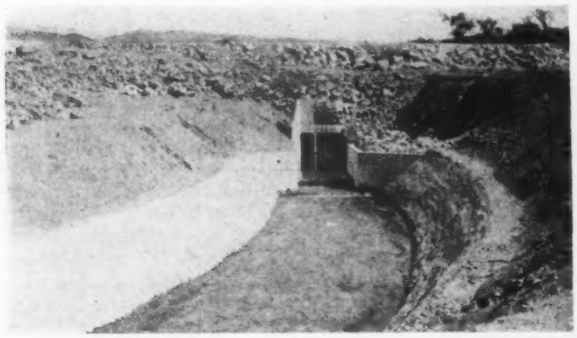


FIG. 2—FILLING OPERATIONS at East Barre dam just getting under way. The rock fill for the downstream third is shown in background.

FIG. 3—TRUCKS, TRACTORS and rollers at work on Wrightsville dam, which will contain 1,140,000 cu.yd. of fill. Fill material is spongy when first placed, requiring services of tractors to get loaded trucks to dumping points, but later consolidates.

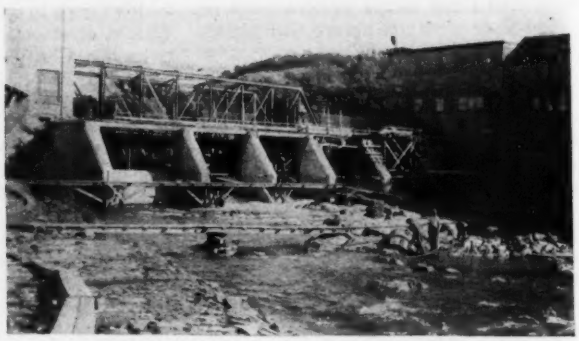


FIG. 4—AN IMPROVEMENT to provide free flood flow on the Winooski River is the replacement of an old timber dam at Montpelier with this modern concrete structure topped with tainter gates. The dam is being built by CCC labor.

FIG. 5—PLACING RIPRAP on the upstream face of the Wrightsville dam, a type of work suited to hand-labor methods. Sufficient stone for this purpose so far has been picked out of the fill, another hand-labor operation.

progress than the earlier prosaic stripping operations. No finer concrete structures can be found than those built in the cold and snows of northern Vermont by these inexperienced labor crews under competent supervision.

At Wrightsville, the winter work, other than building the diversion conduit, centered chiefly in spillway excavation and the hand-cleaning of a multitude of pot holes and depressions in the ledge rock laid bare by stripping operations. The ledge surface was dotted with solid rocky projections, around whose bases were scoured deep narrow pockets. Hand-shoveling was the only means of cleaning out these pockets, and provided excellent work for the labor units.

At East Barre, aside from conduit construction, work consisted principally in quarrying granite waste for use in the downstream third of the dam. This material was loaded by hand into trucks for transportation to the dam. Some of it, selected for later paving operations, was stored for use this year, but most of it went directly into the fill. Another use of hand labor at this job was the paving of a curved channel leading from the outlet of the diversion conduit to the original stream bed for a distance of 500 ft. This channel had been partly excavated during the fall months. The paving on both side slopes and bottom consists of individually placed blocks of granite, roughly 18- to 24-in. cubes, which had been selected from the quarry waste pile and trimmed with plugs and feathers. These blocks were placed with their tops forming a plane surface, with about 3-in. clearance between adjacent units. Then concrete was rammed into the joints, binding the whole into a solid thick paving (Fig. 1).

Earthfilling rushed

At both dams earthwork is now in full swing, getting under way early in June. Weather and ground conditions at the dam sites and borrowpits prevented earlier large-scale operations. Endless streams of trucks, aggregating 200 in all, pass from borrowpits to fill and back again. A dozen power shovels load the trucks. At East Barre daily yardage placement averages 4,000, while 10,000 cu.yd. is being placed every day at Wrightsville, weather permitting. The East Barre filling was handicapped at first by the installation of a new water line for the city of Barre, which passes under the fill in a deep trench. The line is now complete, permitting a full sweep of filling operations. Filling at Wrightsville was slow at first because the uneven surface of the rock ledge restricted the movement of equipment and limited dumping to small areas. After six weeks the fill had cleared all rocky projections and work was much faster.

The dams are being built with selected materials in the upstream two-thirds with a clay core at the axis. Selection of material is done at the borrowpits. The East Barre pits are providing ideal material, easily handled. At Wrightsville the proper classes of materials can be selected at the pits and the mixing is done in place at the dam. Some of the material, a wet blue clay, is difficult to handle. When first placed, this clay is spongy. Trucks mire in it easily when freshly placed, frequently requiring the services of tractors to pull the trucks to the dump and then extract them from the engulfing soil. Showers add to the troubles in placement of the clay. After a few rollings this spongy material compacts to an impervious mass, making an excellent fill.

The labor crews work in two shifts of six hours each. Normal filling and compacting operations at East Barre are sufficient to consolidate the embankment. At Wrightsville bulldozers, tractors, disk harrows and rollers are run back and forth over the day's fill for several hours after dumping has stopped, thoroughly to mix and consolidate the material, and to prepare the surface for the next day's operations.

At present the CCC units are at maximum strength for the year. Every effort is made to find work for all. Maintenance of roads, riprapping slopes, picking stones out of the fill and checking trucks and yardages are some of the numerous tasks performed by the CCC labor forces. All equipment is hired by the hour on a low-bid contract basis.

At the present rate of progress both dams will be completed this year. If bad weather threatens a delay at Wrightsville, filling will be concentrated on the upstream third of the embankment to gain height and provide utmost protection against overtopping by a flood. The new concrete dam on the Winooski at the plant of the U. S. Clothespin Co. of Montpelier is about ready for the installation of the tainter gates, and will be completed this season (Fig. 4).

Attitude of CCC

The varying attitude of the CCC members toward their work during the past year has been interesting to those in charge. Last summer and early fall, work consisted principally in stripping operations, which were uninteresting and subject to little observable progress. The men showed little enthusiasm for this work, resulting in a very low degree of labor efficiency. Picks, shovels and wheelbarrows were especially distasteful to them. By early winter the malcontents and trouble makers had been weeded out of the crews and the work had evolved into more interesting tasks. In the building of the concrete structures and in the laying of riprapping and stone paving good progress was possible. The men really became interested and worked more willingly, raising the labor efficiency appreciably.

This summer a spirit of competition has been introduced, especially at Wrightsville, which has maintained and even increased this efficiency. A huge signboard, visible from all points on the job, carries the figures of the yardage placed in the fill each hour. This simple device has resulted in a constant striving to beat the previous hour's yardage placement and to set a new high mark. On the riprapping work the slopes are laid off in wide strips. Crews responsible for each strip have developed a rivalry that is the evening topic of conversation and argument at the camps.

Direction

Design and construction of all flood-control works in the Winooski Valley are under the direction of the U. S. Engineers, First New York District. Col. G. R. Lukesh is district engineer in charge, with Maj. E. E. Gesler his resident assistant at Montpelier; Harold E. Libby, engineer, is in immediate charge of both design and construction. C. R. Moore is superintendent at Wrightsville, and J. V. Downing is superintendent at East Barre. Assistant superintendents and foremen are civilians hired for the job, a number having been promoted from the CCC ranks.

Progress in Straightening the Mississippi by Cutoffs

Eight cutoffs are now taking part of the flow of the river—Length of the river shortened by 70 miles—Pilot channels are dug with dredges and dragline excavators—River flow used to enlarge the pilot channels

WATER is now flowing through eight cutoffs on the section of the Mississippi River lying between the mouths of the Red and Arkansas rivers. One of the eight is a natural cutoff, a second is essentially so, and the remainder are artificial. All but one of them has been opened during the past twenty months. Thus rapidly is a policy being abandoned that has been a major factor in Mississippi River control since the days of the monumental report of Humphreys and Abbot in 1861. The Humphreys and Abbot report declared that the river regimen was adversely affected by the shortening of the channel resulting from a cutoff, that water levels above a cutoff were decreased and that the levels below were permanently increased. It said further that the river, in attempting to restore the balance of forces upset by the cutoff would cut a new loop to restore the lost distance and decrease the slope. Consequently the principle was laid down that the formation of cutoffs must be resisted regardless of cost. For years that principle governed the Mississippi work.

Ample support for this opinion was cited from the records of past cutoffs; and were future plans to be based solely upon observations of the action of the river itself, present records would still give support to this opinion, for in the period of over a century and a half during which accurate records have been kept twenty cutoffs have shortened the river by 228 miles and the river has regained virtually all the lost mileage by creating new sinuosities of channel.

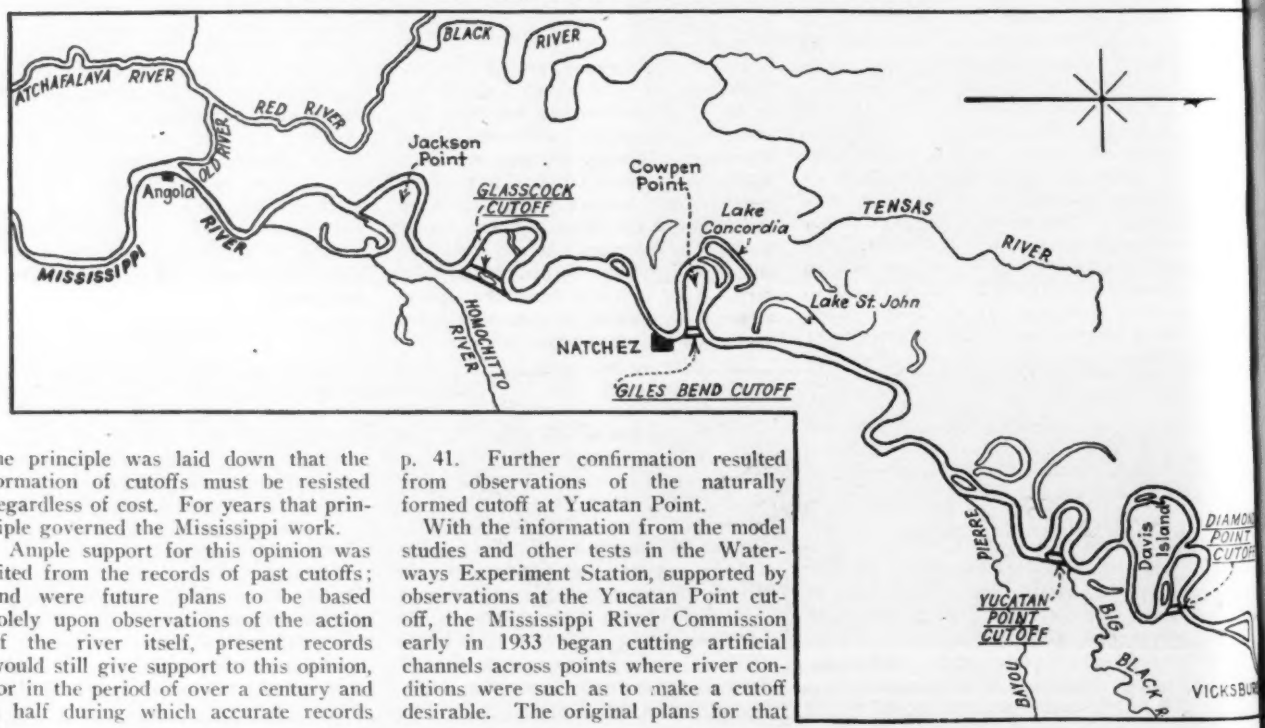
But in the past five years new thinking has been directed toward a plan of channel rectification and stabilization in which cutoffs figure prominently as a means of expediting the evacuation of floodwaters and a lowering flood stages. This plan, furthermore, is calculated to effect savings in revetting river banks well in excess of the cost of making the cutoffs, besides effecting material savings to navigation and channel maintenance by reason of mileage eliminated. The establishment of the U. S. Waterways Experiment Station of the Mississippi River Commission at Vicksburg, Miss., resulted, in 1932, in confirming the practicability of this plan. An account of these experiments was published in *Engineering News-Record*, July 6, 1933, p. 14, and July 13, p. 41. Further confirmation resulted from observations of the naturally formed cutoff at Yucatan Point.

With the information from the model studies and other tests in the Waterways Experiment Station, supported by observations at the Yucatan Point cutoff, the Mississippi River Commission early in 1933 began cutting artificial channels across points where river conditions were such as to make a cutoff desirable. The original plans for that work were described in *Engineering News-Record*, June 29, 1933, p. 838, as part of a series of articles on "New Plans for the Mississippi." Subsequent developments have somewhat modified the program given in that article, but the general principles there outlined are being followed.

In opening a new cutoff the energy of the river is used to the largest extent possible in creating the new channel. The first step is to excavate a narrow channel down to about low-water level, using either dragline excavators or hydraulic dredges, or both, depending on local conditions. After this pilot channel has been completed, the water is permitted to flow through it on a rising stage, when conditions for scour are propitious. In some cases occasional dredging is required in the new channel to hasten its enlargement by removing hard ridges and bank slides.

Yucatan Cutoff—The cutoffs now open and in process of enlargement are shown in the accompanying map of the Mississippi River from the mouth of the Arkansas River down to Old River. The principal physical facts relating to them are set forth in the tabulation herewith. As previously noted, the Yucatan Point cutoff was a natural cutoff that developed during the high water of 1929 when the river broke through into the channel of Black River. Since that time it has enlarged to the point where during the past winter the new channel carried 100 per cent of the low flow, and last spring carried 90 per cent of the total flow

CUTOFFS under construction on the Mississippi River below Greenville are shown in the accompanying map. Seven cutoffs, in addition to the natural cutoff at Yucatan Point, have been undertaken to date. They will reduce the river distance by about 70 miles.



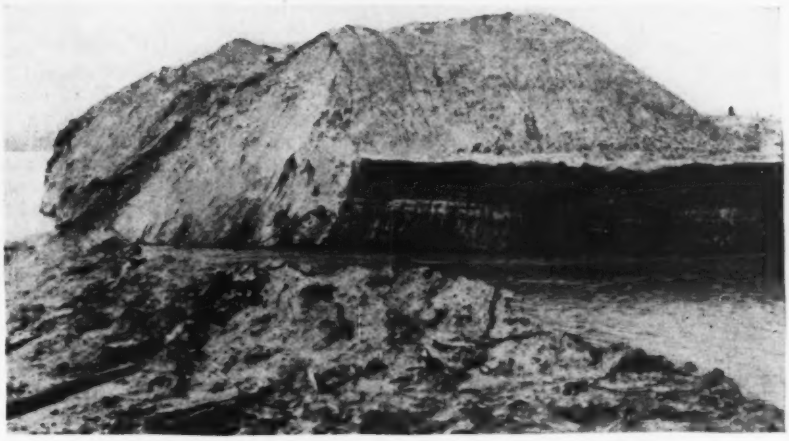
THE START of a cutoff, showing the pilot channel made by tower excavators for the new channel across Worthington Point. From this stage the river is allowed to cut its own channel.

of the river. However, there has been no very high stage so far this year. This cutoff now is 1½ miles long and reduces the channel length by 10 miles.

Diamond Point—The first of the artificial cutoffs to be made was that at Diamond Point. It was opened in January, 1933, and carried about 42 per cent of the low water during the past winter. It results in a saving of about 12 miles and is 1½ miles long. River navigation now is using this new and shorter channel.

Glasscock—The Glasscock cutoff was opened during the high water of March, 1933, and dredging was carried on through the summer of last year, but the channel is still small and carries little water except during high stages. It is one of the longer cutoffs, being about 4 miles in length. It will shorten the distance by river 11 miles.

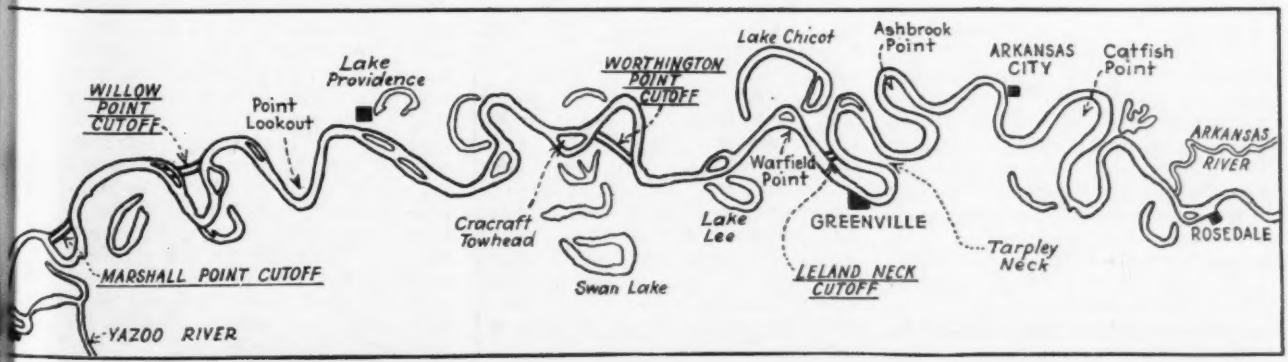
Giles Bend—The cutoff at Giles Bend above Natchez was opened during high water in June, 1933, and since that time some dredging has been done to enlarge the channel and to remove numerous slides. It is expected that the channel will be enlarged sufficiently this summer for water to go through during the low-water period of this year. The new channel, 2 miles long, reduces the river distance by 11 miles.



THE WORTHINGTON POINT CUTOFF was opened in December, 1933. This picture, showing the lower end of the cutoff, was taken early in March of this year as the rising water in the river was rapidly enlarging the pilot channel.

Leland Neck—In June of last year high water broke through Leland Neck in the Greenville Bends, but the breakthrough occurred at the crest of the high water and little damage was done. However, as the river has been attacking this neck for many years, breaking through in the 1929 flood and cutting a deep "blue hole" before the flood subsided, it was decided to abandon further attempt to prevent formation of a natural cutoff and to use the river as an aid in controlling the alignment and rate of cutting. The details of the initial work done there were published in *Engineering News-Record*, Sept. 21, 1933, p. 358. By February of this year the cut was carrying 60 per cent of the low flow of the river, having enlarged to a width of about 1,000 ft. It is about ¾ mile long and cuts off 10 miles of distance on the river. It was opened to navigation June 6, 1934.

Worthington Point—Water was admitted to the pilot channel in the



MISSISSIPPI RIVER CUTOFFS, ARKANSAS RIVER TO OLD RIVER

Cutoff	Date of Opening	Miles Below Cairo (1913 Survey	Distance Across Point C/L to C/L of River (Miles)	Distance Around Bend (Miles)	Reduction in River Length (Miles	Length of Cut, Top of Bank to Top of Bank (Feet)	High-Water Fall Across Point (1929)	Low-Water Fall Across Point	Discharge in Sec.-ft. April, 1934
Leland Neck	July 8, 1933	472.0–483.5	1.3	11.3	10.0	3,900	4.3	3.4	390,000
Worthington Point	Dec. 25, 1933	505.7–513.3	3.8	8.1	4.3	17,600	3.7	1.6	21,000
Willow Point	April 8, 1934	564.0–578.0	4.7	12.4	7.7	22,000	4.0	3.7	68,000
Marshall Point	March 12, 1934	587.0–593.0	3.1	7.3	4.2	13,600	2.2	2.2	85,000
Diamond Point	Jan. 8, 1933	613.6–626.0	2.6	14.6	12.0	9,175	2.2	4.2	350,000
Yucatan Point	Fall of 1929	638.3–648.0	2.6	12.2	9.6	11,000 in 1929 8,500 in 1933	3.7	1.3*	790,000
Giles Bend	May 25, 1933	689.5–704.1	2.9	14.0	11.1	10,000	4.6	2.8	16,000
Glasscock Point	March 26, 1933	722.5–736.7	4.8	15.6	10.8	20,800	3.2	2.4	24,000
Total reduction in river length						69.7 in 264.7 miles			

*Affected by slope adjustments that have taken place since the cutoff occurred.

Worthington Point cutoff in December, 1933. It had been dredged to a point where water can pass through at 15 ft. above low-water stage. Dredging was carried forward during the high water of last spring in the upper end of the channel in order to increase the amount of water passing through and so hasten the enlargement. The Worthington Point cutoff is over 3 miles long and reduces the river distance by 4½ miles.

Marshall Point—The plug between the two channels dredged to form the Marshall Point cutoff was blown out early in March of this year, and water began running through at 20 ft. above the low-water stage. This channel has cut to a depth of about 20 ft. and an average width of 200 ft. during the present high water. It is 3 miles long and reduces the river distance by about 4 miles.

Willow Point—The pilot channel for a cutoff at Willow Point opened itself April 8, 1934. As will be seen from the map, this cutoff goes through both the neck of Willow Point and the island lying at the southerly side of the neck. When completed it will be 4 miles long and will reduce the river distance by about 8 miles.

In all, nearly 70 miles of river distance is to be eliminated by the cutoffs now completed or under construction in a total present river distance of 265 miles, a saving in length of 26.4 per cent. Of the 70-mile shortening, 43.5 miles are in the section below Vicksburg.

Electricity Extends Service to Construction

Spread of power lines and improvement of mobile generating units are overcoming obstacles to broader use of electric power for construction operations

By J. A. Jackson
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THE principal drawbacks to the use of electric power in the construction field have always been: (1) lack of a standardized power supply, (2) inability to get any electrical power in many locations, (3) inability on the part of some power companies to take on a temporary load of widely varying character, and (4) the difficulty and expense of tapping a high-voltage transmission line to take off a relatively small block of power of a temporary nature. The last three of these obstacles has prevented entirely the use of electricity in many locations, while the first made it necessary for contractors to carry motors for both alternating and direct-current circuits and for the various phases, frequencies and voltages encountered, an expense that could not be justified.

Conditions have changed in the past decade. At the present time 70.5 per cent of all the people in the United States is served with electric power, and 86 per cent of the urban population is so served. Distribution of electricity in the rural districts is being demanded by the farmer, and his demands are being met by cooperative efforts between the utilities and manufacturers. This contributes greatly to the availability of power for the construction industry.

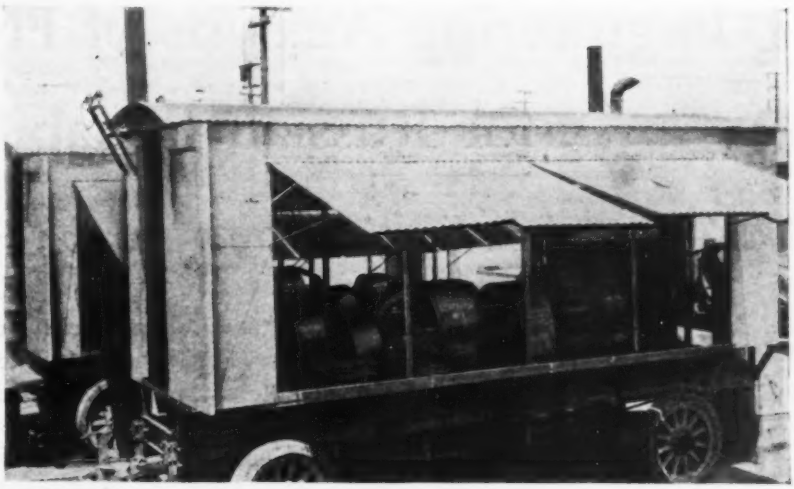
It is safe to say that close to 90 per cent of the power developed in the United States is at 60 cycles, three-phase, and there is a very definite trend to curtail all other forms of power; this elimination of odd forms is taking place quite rapidly. Practically all new power projects are being developed to supply three-phase 60 cycles except in a few isolated sections where other power, principally at 50 cycles, is well intrenched.

Statistics published by the Department of Commerce show that 90 per cent of the construction work (based on dollar value) completed in 1930 was located in the 24 most populous states in which 79 per cent of our people reside. These states are the most extensively electrified and are now well served by high-tension transmission lines capable of supplying large blocks of power. From these statistics it is quite evident that for a large percentage of construction jobs, electric power of a uniform kind will be available, and its use could be profitably discussed with the interested public utility prior to making up a price on the job.

The attitude of the public utilities toward the construction type of load, with its intermittent character and high peaks, is changing, and such loads are becoming more acceptable. Many construction jobs are paving the way for future permanent loads for the utilities, and in recognition of this it should be less difficult to get power lines run in to construction sites as such lines can be used later to supply the permanent load. Interconnection of power lines into huge network systems provides the surplus capacity necessary to take on the high-peak temporary loads without detriment to the permanent customers. Equipment has been developed by the electrical manufacturers that permits taking off relatively small blocks of power from high-voltage lines without excessive investment or installation cost.

Many miles of highways are now electrically lighted to reduce the hazards of night driving, thus providing a possible supply of electric power for construction and repair contracts on the lighted sections. On unlighted highways the placing of construction and repair contracts could profitably be preceded by the installation of power lines along the sections under construction. This would provide power and light for construction purposes, highway lighting after completion and a source of power and light for farms along the highway, thus performing a triple function.

From the foregoing, it is quite clear that the principal drawbacks to the availability of electric power have been and are progressively being eliminated in those states where the major portion of construction work is carried on. Other changes have taken place to make the use of electric power by contractors more attractive.



PORTABLE POWER PLANT for construction operations where commercial current is not available.

Standardization by manufacturers

The electrical manufacturers have effected certain standardization, principally on motors, which greatly benefits all motor users, including contractors. Horsepower ratings and speeds have been standardized from ¼ up to and including 200 hp. on both alternating and direct-current motors. The principal mounting dimensions of the motor frames and shaft-extension sizes have been standardized on a.c. squirrel-cage motors up to 125 hp. and up to 75 hp. on wound-rotor a.c. induction motors. Similar standardization on special lines of motors suitable for the heavy intermittent duty encountered by some contractors' machinery has either been effected or shortly will be. This means that motors of any manufacture within this range of sizes will have the same ratings and will be interchangeable so far as all principal mounting dimensions are concerned. The advantage of this in case of a breakdown on a rush job needs no explanation.

Motors and control designed particularly to stand the rough service and weather conditions encountered in construction work are now readily obtainable and will perform the duty required with remarkably low maintenance.

Electric drives can be successfully used on any machine that can be driven by steam or gas engines, omitting, of course, equipment used for long-distance haulage such as trucks. The use of electricity, however, covers a much broader field today than it did a few years back, and the far-seeing contractor will realize that this field extends into his business. Electric welding is now almost indispensable for repair work and finds application on many permanent structures. Electric rivet heaters are on the market. Electric heat can be used for innumerable places on a construction job—for example, cooking and room heating in the construction camp, heating water for shower baths, dish and clothes washing, etc., prevention of freezing—particularly in pumps and truck radiators, heating crank-case oil in trucks to permit easy starting, electric steam boilers to provide small amounts of steam for miscellaneous use, vulcanizers for repairing truck tires, soldering, heating storehouses to keep cement and other materials in better shape, and there is even the possibility of preventing fresh concrete from freezing by the use of electric soil cable. Many of these presuppose winter work. Speed in many cases and reduced traffic on highway and bridge jobs are compelling more and more construction work to be done in the cold months. This forces upon the contractor the necessity of finding new ways of doing many things, and electricity may frequently point the way to success.

Winter work and the use of two and sometimes three shifts means night work with its necessity for adequate lighting. Electricity unquestionably leads in this field. Incandescent lamps can be conveniently obtained in all sizes with reflectors and sockets suitable for all kinds of work and weather conditions. Unaffected by wind, rain or snow and giving a light of high penetrating power, the degree depending on the type of reflector used, they provide the most effective illumination known for either general or concentrated effects.

A recent development, the sodium vapor lamp, used primarily for highway lighting, provides a high-intensity, nonglare general illumination with the possibility of a better penetrating power in foggy or snowy weather than the tungsten incandescent lamp, and power consumption is roughly one-third to one-half that of a tungsten lamp of equal candlepower. The sodium vapor lamp requires somewhat more auxiliary equipment than the tungsten lamp and might be justified only on a long-time job of considerable magnitude.

Interior illumination of the construction camp by modern electric methods improves the living conditions and reduces the fire hazard, thus improving the morale of the personnel and providing greater safety. Amusement can be provided by motion-picture shows.

Portable electric plants

The one problem not yet touched upon is this: what is the contractor who has electrified his machines going to do when he cannot obtain electric power? The best answer to this is the portable gas-engine-driven electric plant, which on a small scale has been successfully employed by the large circus owners for general power and light purposes for many years. Such plants can be mounted on covered trailers and drawn to the site by construction trucks. The trailer could then be parked at a convenient place and wired up to the construction machinery and buildings.

Preliminary figures indicate that a portable plant of 250 kw., driven by a six-cylinder engine of 425 hp. at 1,200 r.p.m., could be mounted on a trailer with a platform 14 ft. long and with a dead-weight capacity of 7½ tons. On a normal-width trailer there would be room for a suitable switchboard for distribution and protective purposes. Such a portable generating plant would take care of a fair-size construction project, and for greater capacity several could be operated in multiple. Such portable plants would represent quite a respectable investment, and, if owned by a contractor, this investment would no doubt be idle for extensive periods. This favors ownership by companies in the business of renting construction machinery, thereby increasing the load factor on the portable plant.

Such portable plants would enable a contractor with electrified machines to use his equipment no matter where the job may be located, and thus gain all the advantages of complete electrification.

Engineering Analysis of Five-Year Plans for Russian Rehabilitation

III—Rationalization Program for Future Construction

Research, standardization and rationalization undertaken to improve future construction—Fulfillment of first five-year plan—Analysis shows general failure—Magnitude of second five-year plan

By Zara Witkin
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THE first five-year plan in construction revealed many serious weaknesses of operation, as has been shown in the two preceding articles. So little progress was made in rationalization of construction methods to lower excessive costs and increase productivity that these have been proclaimed as the main new objectives of the continuing plan. A general program of standardization and rationalization has been undertaken. In some cases, the rationalization department of the Heavy Industry Commissariat Construction Trusts originates the study and completes it, in others it outlines the main features and issues instruction to the engineering institutes under the jurisdiction of the Commissariat of Heavy Industry for the necessary investigations. It also reviews finished reports from various institutes. When these have been approved, the final recommendations from the trusts go to the Commissariat of Heavy Industry, there to receive mandatory action involving the necessary appropriations to put into effect.

Local materials research

Out of the transportation condition has grown insistence on the fullest development and utilization of local material. Extensive geological investigation is in progress to ferret out local sources of rock and gravel and various other aggregates, cementitious materials, diatomaceous earth, gypsum, lime, etc., as well as vegetable material such as reeds, husks, wood bark, straw and other material which can be converted by cementation and pressure into building-material units. Local clays for brick, and finally the inexhaustible earth itself, compacted into building blocks with heavy old-residue binder under hydraulic pressure, are examples of this section of the rationalization program.

Various industrial research groups are engaged in tests of minerals and natural substances, including the silicates, volcanic ashes, clays and turfs, and are ransacking manufacturing scrap-heaps and by-products to determine the full possibilities of their use as building material to reduce the load on railway transport, for whose services general industry, agriculture and commerce clamor.

Prepared building units

Standardization of units is planned to bring the process of manufacture as quickly as possible in line with the best modern practice. The supply of concrete aggregates has not been satisfactory. The new plans call for washing and grading to be done at the quarry or plant. Centrally located storage bunkers will be built to furnish distributing and reserve capacity during the building season.

The great ranges of temperature encountered in U.S.S.R. make the problem of insulation of buildings much more serious than in American practice. This requires cheap durable insulating material, and this in turn must be coordinated with the directed use, so far as possible, of local materials.

The effort is being made to replace burned-clay brick by cold process brick such as sand lime, lime-diatomite and other combinations. Brick clay is to be had in abundance, but the relief of the heavy fuel transport load is the moving cause of this new development.

The building-lumber industry is still in its infancy, and stocks of dimensioned seasoned lumber are unknown. Beams and joists are generally hand-hewn from logs. Planks are often sawn from logs on the job by hand. Lumber sizes will be standardized, and members will be mechanically sawn, through greater application of power.

Extreme shortage in other building materials has had the effect of increasing the relative use of lumber. Wood is now being designed, even for foundations. The problems of wood preservation and protection have therefore become important, and preventatives against deterioration and destruction by water, fungus and fire are scheduled for increasing use.

Cement production has lagged so far behind demand that research is in progress to develop other cementitious materials. Chemicals and economic studies in this field have already yielded valuable results. Every effort is being made to produce cement requiring lower amounts of heat in the manufacturing process, which will reduce the fuel-transportation burden on the railways.

Gypsum, hitherto practically unknown in U.S.S.R., has been found recently in considerable amounts and opens up a whole new field of application in plastering and insulating. Gypsum structural units are being designed. The application of gypsum by mechanical pressure to large insulating plates of fibrous material for interior finish has been developed. Plaster board is projected but will doubtless be held back by lack of necessary paper.

The manufacture of masonry units has come under a comprehensive review. New hollow blocks have been designed and standardized, to replace the scores of unsatisfactory miscellaneous units of different sizes, compositions, weights, strengths, voids and costs. The new units are divided into two main groups —one for manual placing and the other, large units, for mechanical placement. These are to be used in conjunction with the new gypsum-faced insulating fiber plates, to reduce the present cost of wall construction, with significant savings in material, labor and time of operation, decreased heat conductivity, and the release of large numbers of skilled men for other work by eliminating large amounts of lathing and plastering.

Vibration and pressure methods of making thin wall units of precast masonry are under investigation, to secure much higher strength and reduce necessary weight and volume of units.

Production of metals, in general, is seriously behind demand. Conservation is essential. Careful attention is being given to the use of various metals in building, such as lead and zinc in pipe joints. Special compounds are being developed for replacing these. Steel and iron pipe are supplanted wherever pos-

sible by concrete and wood. The use of compressed air in vents is proposed to reduce the required size of pipe ducts.

Materials standardization

Cement is made in several grades, highly confusing in regard to fineness, time of set, strength, color and other characteristics. Lumber is classified in about 1,000 standard sizes (many times more than American practice). Steel for reinforcing also has an excessive number of sizes. Round bars are customary. Steel-wire welded mesh is not yet made. Brick fairly well defined as to size has greatly varying qualities, such as absorption, hardness, surface, color and density. Burned clay, lime slag, lime and diatomaceous earth and other brick are all placed together in the same wall indiscriminately. Masonry blocks of literally hundreds of different sizes, mixes, shapes, voids, weight and porosities are made in as many plants. For each of these materials rational simplified standards are being formulated, decisively influencing efficiency, quality, production cost and use, as well as simplifying design.

Finally, the methods of production of materials are being critically investigate and rational plans designed to replace and extend the present manufacturing facilities. These include masonry block plants, precasting plants, central mixing plants for concrete, lumber mills, steel-fabricating plants, factories for manufacturing and assembling units of standardized buildings and many others.

Rationalized design

Immense impetus has been given to rationalization of design by the exigencies of the material shortage situation. The enforced economizing of steel, cement and other standard materials and the required employment of new and substitute materials have been the energizing factors of invention in this field.

Structural steel is being replaced to the ultimate possibility by reinforced concrete. Reinforced concrete in turn gives way wherever possible to brick and wood. Precasting concrete is extensively proposed to realize the economy in cement and weight of structure that can be effected by the higher quality of plant-made units compared to average job-poured concrete. Rationalization of design of reinforced-concrete beams, joists, slabs and foundations has been tentatively developed eliminating useless concrete on the tension side of the neutral axis of such members. This is combined with the unique use of different kinds of concrete in the same member.

Standardization of sizes of units is coordinated with design, fully to utilize them. This will gradually create possibilities of design from standard handbooks of construction elements, as in American practice.

The enormous volume of repetitive, typical construction affords great opportunity for standardization of design to secure minimum weight of material and the greatest amount of industrialized production, especially of wood structures.

Studies of utilities and mechanical services are under way to modernize heating, plumbing and ventilating design and equipment.

Foundation design has been investigated to meet frost and earthquake conditions. Standardization of wood roof trusses is planned, to effect economy in labor and material, to obtain greater strength and to speed up construction.

EXPERIENCE in carrying out the first five-year plan impressed the Soviet authorities with the vital necessity of materials research and standardization. An elaborate program was laid down embracing local materials research and the study of prepared building units, standardization of materials, rationalized design and utilization of power. As a result of these studies, still in progress, a whole group of new plants such as central concrete mixing and block-casting plants, steel-fabrication plants and plants for milling lumber and producing wood trim, are being constructed. Together they constitute an ambitious plan to raise the quality of Russian construction.

Wood-floor and wall structures have been thoroughly analyzed, and conventional carpentry practice will be replaced by engineering design of these elements. By using thicker subfloors (and consequently fewer joists) and solid firestop bridging, great economy in labor, lumber and fastenings is achieved, as well as a more rigid, stiffer, stronger, more durable and more fire-resisting structure.

Finish floor veneer sheets in large sizes has been proposed, greatly facilitating the speed of laying and saving a considerable part of the lumber, nails and labor.

Insulation, always a problem owing to the severe winters, controls window design. It is planned to introduce windows with double-glazed single sash with dehydrated air space in narrower frames, requiring only one set of hardware and one sash instead of the present two and saving labor and material in fabrication and erection in cleaning, puttying up in the winter, opening in spring and insuring lower heat conductivity.

Study to utilize power

The first five-year plan in construction considered the development and application of power to the building industry a fundamental necessity. This has been only partly accomplished. Measures are now pending to improve this serious situation. Mechanization of hand tools by the use of electric and pneumatic power has been investigated, and the Soyustroi report and recommendations are before the Commissariat of Heavy Industry for appropriations to manufacture these power tools in the Soviet Union.

Continuous operation in construction is the heart of economy and efficiency. Seasonal interruption causes great losses in labor dislocation, in low exploitation of expensive equipment, in depreciation of incomplete structures and in capital "frozen" in unfinished plants and buildings. The severe Russian winters halt operations several months each year. Considerations of economy impel the development of winter working methods to allow continuous construction. Several trusts are engaged in formulating the necessary procedure.

The application of power to construction extends beyond the scope of tools and is projected into the field of work where manual labor is arduous, such as excavation and transport of bulky materials. The most economical types of earth-moving machinery and hoisting devices for different conditions are being determined. Directive instructions for use will then follow.

A whole group of relatively new types of plants for the Soviet Union are planned, and some are already in the stage of construction. They include central plants for mixing concrete, precasting concrete, fabricating steel, milling lumber and wood trim and others. One example is the central concrete-mixing plant at Leningrad. A plant for precasting masonry blocks of slag is being built at Magnitogorsk, also a cement mill using slag. The great advantage they possess over similar plants in other countries is that they can be precisely located and designed for capacities related to definite planned volumes and distribution of construction, known in advance. The economy and efficiency of such plants on an annual basis should exceed any existing, for this reason.

General overhauling of all equipment, tools and machinery for the construction industry is in progress, and designs of new tools have been prepared, based largely on American models. (American models were adopted in report of March, 1933.) The amount, condition and productivity of all machines are being determined, and schedules of required new equipment are being drawn up for production.

An exceedingly important field is standardization of formwork for concrete construction. The present heterogeneous methods are staggeringly wasteful of labor and require too much material. Salvage is also excessively low. Extensive work has been done in this section by several trusts and other institutions.

This is a synopsis of the main divisions of the general rationalization program for the construction industry of

U.S.S.R. Upon it rests the planned improvements in cost and productivity set forth in the party directives announced in the January, 1933, plenum session. Every phase of material production, design and methods of construction is embraced. Many sections are included which are too detailed to mention here.

Together they form an ambitious unparalleled plan to raise sharply the quality of work in the nation's basic construction. This movement is locked in a deadly struggle against the intrenched bureaucracy, which strangles their best efforts.

Fulfilment of first five-year plan

How much of Soviet Russia's five-year plan was actually accomplished has been widely discussed through the world. The official statement of Stalin in January, 1933, was 93.7 per cent. How far the plan was really completed can be derived from the levels of Soviet industries in 1928 and 1932. The correct determination is by comparing actual increase to planned increase; for example, the steel industry in 1928 produced 4.2 million tons. The plan provided for an increase of production of 6.1 million tons per year in the last year of the plan, making a total for that year of 10.3 million tons. The final year's actual production was 5.9 million tons, an increase of 1.7 million tons, and a real fulfillment of 1.7 divided by 6.1, or 28 per cent. Usually an entirely misleading calculation is made, comparing total production of 5.9 million to the total planned production of 10.3 million tons, giving 5 per cent accomplishment. This overlooks the all-important fact that production was 4.2 million tons per annum without the plan. By this method, if no increase at all had been made, the accomplishment would be 42 per cent, which is, of course, an absurd method.

Another erroneous and misleading method of figuring accomplishment is to compare the planned investments in stabilized currency at the beginning of the plan to the actual expenditures in heavily depreciated currency as the plan went forward. This gives a so-called over-fulfillment in certain industries, such as the steel industry, where actual accomplishment is but a small fraction of the plan.

The method used for determination of the fulfillment of the plan in this analysis was by the comparison of actual construction of railway lines, industrial plants, housing, highways and all elements of the construction program.

Verifications of the conclusion reached by this basic analysis were developed from the increase of actual output in industries, compared to the planned increase. Other verifications were used, including manpower employed, corrected for labor productivity, by the total of building material produced, and finally from the amount of power developed and utilized.

THE OFFICIAL STATEMENT of the magnitude of the second five-year plan is that it is 2⅔ times as large as the first five-year plan in capital construction. But this is founded on the comparison of 133.4 billion 1933 rubles capital investment total in the second five-year plan to 46.9 billion "rubles of respective years" in the first five-year plan. In rubles of respective years the second five-year plan has a value of only 40 billions. The second five-year plan is thus less than the first five-year plan instead of 2⅔ times as large, as officially stated.

Fulfillment in certain of the basic divisions in industries and construction were as follows:

	Per Cent		Per Cent
Steel	28	Brick	40
Locomotives	98	Lumber	28
Freight cars	7	Railway freight	108
Tractors	28	Ry. construction	38
Autos and trucks	13	Housing	44
Cement	37	Electrification	79

The weighted average fulfillment of the first five-year plan computed from the full analysis of all elements of the construction program was approximately 60 per cent.

The entire first five-year plan, as has been shown, equalled less than one average year of American construction in the last decade. Fulfillment of the first five-year plan amounted to about 60 per cent, instead of the 94 per cent officially proclaimed by Stalin in January, 1933. Thus all the actual construction done under the entire first five-year plan equalled one-half year of American construction.

Magnitude of second five-year plan

The imagination of the whole world has been captured by the magic Soviet catch-phrases "five-year plan," "controlled economy" and "collectivization." Everywhere they are looked to with faith born of economic suffering, with hope that they represent a way out. The enormous budgets of the Soviet program expressed in rubles, when converted into other currencies at the official rates of exchange, have staggered the minds of observers. The general uninformed impression in the world is that the first five-year plan was successfully carried out, and that the U.S.S.R. planned economy stands like a rock in the tempest that has swept away so much of the economic apparatus of the capitalistic countries.

The official statements of the second five-year plan are powerful stimulants to this faith. They exude optimism. They breathe the very fire of victorious economic advance. For it must never be forgotten that the first five-year plan and all succeeding five-year plans are by no means cold analytical presentations of engineering development. They are highly political documents prepared especially for world consumption, as well as for the artificial respiration of a people reeling under terrible shortages of life necessities.

What the official statements of the Soviet government have failed to do in painting the main scenic effects of this gigantic economic drama, enthusiastic and incompetent foreign commentators have completed with their rhetorical embellishment. The Soviet Premier, in his historic presentation of the second five-year plan, declared:

"Thousands of advanced enterprises have been built up which have brought the entire national economy to a high level of growth, and which are on a level with the best examples of capitalist technique.* * * The victories in the development of industry have continued the gigantic success for shifting agriculture onto the lines of machine technique. * * * The great success in the creation of a new labor discipline, the growth and the qualification of the workers, and the considerable achievements in the organization of production have made it possible to obtain in the process of technical reconstruction tremendous victories in the matter of raising labor production. In regard to the rate of increase of labor productivity, the U.S.S.R. is in advance of all capitalist countries, even in the years of their greatest prosperity. The advantage of the Soviet order in the phase of development already attained has made possible the complete liquidation of unemployment, the introduction of the seven-hour labor day and the abolition of poverty and pauperism in the village."

These are magnificent words, but they are sadly far from the truth. Approaching the mighty outlines of the new Soviet program, penetrating with the clear light of engineering anyalsis the rhetorial fog with which it is surrounded, one is struck by a mirage-like quality. Its actual walls and buttresses, its columns and towers suddenly stand revealed. These towers are not as high as we have been led to believe, nor are the columns as tall and strong. There are dangerous cracks in the buttresses and walls which may easily cause some of them to collapse.

The bald facts are that the nation has barely enough to eat. Millions died of starvation only a year ago. Although in the largest cities an improvement in the clothes of special groups of the population may be observed in theaters and concert halls, the masses still preserve their pathetic rags. Shelter in the urban districts remains at a rabbit-warren level. With the rising birth rate, the still-advancing urbanization and the failure to achieve more than 40 per cent of the housing program, the condition will hardly be better at the end of the second five-year plan in 1937. Items of general consumption considered as necessities throughout the occidental world are often obtainable in the Soviet Union, though it is found

that life may be sustained without some of them. These conditions do not betoken a flourishing industrialization. They remain the final criterion upon which the results of the Soviet planned economy must be judged.

Lack of trained workers and of accumulated capital, together with the low level of technical facilities, handicapped the execution of the work. The terrible incubus of a deadly bureaucracy sucked the blood and vitality out of living enterprise, destroying the initiative and creative power of vast amounts of human labor. So greatly did the first five-year plan fall short of its objectives that an entire year between its official completion and the beginning of the second five-year plan was taken off for the purpose of "consolidating the gains." This type of phraseology was developed for similar "successes" in the Great War.

The official statement of the magnitude of the second five-year plan is that it is $2\frac{3}{3}$ as large as the first five-year plan in capital construction. This is founded on the comparison of 133.4 billion 1933 rubles capital investment total in the second five-year plan compared to 46.9 billion "rubles of respective years" in the first five-year plan. The hidden fact which determines the meaning of this comparison is the value of the different rubles in which these appropriations are expressed.

The ruble depreciated steadily and heavily from 1927 onward in construction purchasing power, reaching a level approximately one-third of its 1927 value by 1933. This can be derived from the housing program, which in the first five-year plan was five billion rubles of respective years for 62,000,000 sq. m. of living area, or 81 rubles per square meter. The second five-year plan program is 64,000,000 sq. m. for 13.4 billion rubles of 1933, or 210 rubles per square meter. Because of the increased labor productivity of 23 per cent in construction, housing should cost less per unit, or 63 rubles per square meter, instead of which it costs 210 rubles per square meter; which indicates that the depreciation of the ruble carried it to 63 divided by 210, or 0.30 of its 1927 level. This evaluation of the depreciated ruble can also be derived from the analysis of the entire plan of Soviet economy, which was actually fulfilled, as has already been determined, about 60 per cent. The plan called for an expenditure of 46.9 billion rubles of respective years. The actual expenditures were 51.5 billion depreciated rubles. Therefore, the 51.5 billion depreciated rubles equalled 60 per cent of the plan appropriation, or 28 billion rubles of respective years. This gives a value of 0.28 rubles of 1927 for the ruble of 1933.

The fundamental ruble valuations being established for the different years as the currency depreciated heavily, it becomes possible to determine the magnitude of the second five-year plan. Multiplying the 133.4 billion 1933 rubles capital investment program of the second five-year plan by 0.34 (its average value in 1926-27 rubles), we have 46 billion 1926-27 rubles. This equals 40 billion "rubles of respective years" in the period of the first five-year plan. Comparing these two values to 56.5 billion and 48.9 billion respectively for the first five-year plan, the magnitude of the second five-year plan is found to be less than the first five-year plan instead of $2\frac{3}{3}$ times as large.

Proof of the conclusion that the second five-year plan is approximately the same size as the first five-year plan may be derived from the actual quantity production figures set as goals. For this purpose the most important fields of production are selected. These fields include heavy machinery, tractors, locomotives, freight cars, automobiles and trucks, electric energy, coal, steel, oil, iron, copper, lead, lumber, railway freight, sea-borne and river-borne freight, railway construction, housing, highways, etc. The increases in the second five-year plan are compared to the increases in the first five-year plan, the ratio is established in each case, and a weighted total average determined.

The average of all these ratios is 1.1. The weighted average is slightly less. Part of the increase in production will come from existing plants by increased efficiency without further capital investment. The Soviet leaders give the attained increase in productivity as 41 per cent maximum during the first five-year plan. The proposed ultimate increase in the second plan is 63 per cent. Correcting the ratio for the average projected increase in productivity (= 31 per cent), it becomes 0.8. This corresponds very closely with the value obtained by the analysis by rubles of the two plans. It furnishes the quantitative proof that the second five-year plan is slightly smaller than the first.

Successful Planning of Bridge Waterway Openings

Adequacy and uniformity of all openings on a stream can be obtained only through regulations requiring that none be fixed finally until approved by some central state or national authority

By C. H. Eiffert

Chief Engineer, Miami Conservancy District, Dayton, Ohio

THE CONSERVANCY LAW of Ohio authorizes the board of directors of a conservancy district to make regulations governing the building of bridges and other structures in or along water courses or reservoirs in such a district. The section of the law under which this may be done provides that: "Where necessary, in order to secure the best results from the execution and operation of the plans of the district, or to prevent damage to the district by the deterioration or misuse, or by the pollution of the waters, of any water course therein, the board of directors may make regulations for and may prescribe the manner of building bridges, roads or fences or other works in, into, along or across any channel, reservoir or other construction; and may prescribe the manner in which ditches or other works shall be adjusted to or connected with the works of the district or any water course therein; and, when not in conflict with the regulations of the state board of health, may prescribe the manner in which the water courses of the district may be used for sewer outlets or for disposal of waste. The construction of any works in a manner harmful to the district or to any water course therein, and in a manner contrary to that specified by the directors, shall be a misdemeanor. The directors shall have authority to enforce by mandamus or otherwise all necessary regulations made by them and authorized by this act, and may remove any harmful construction or may close any opening improperly made. Any person, corporation or municipality wilfully failing to comply with such regulations shall be liable for damage caused by such failure, and for the cost of renewing any construction damaged or destroyed."

This law was passed in February, 1914. The Miami Conservancy District of southwestern Ohio was organized in June, 1915. This district embraces parts of eight counties and includes the Miami River for a distance of more than 100 miles, Stillwater River for a distance of 30 miles and Mad River for a length of about 15 miles.

In the 1913 flood most of the bridges on these streams were destroyed. The losses, which amounted to hundreds of thousands of dollars, were principally due to insufficient waterway.

After the official plan of this district had been developed sufficiently to deter-

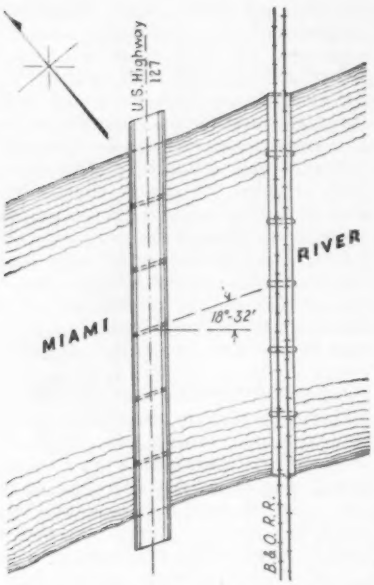

FIG. 1—BETTER REGULATION of waterway openings has resulted in the correct placing of the highway bridge piers shown at the left. The railway bridge piers at the right offer abnormally high resistance to flow.

mine maximum flood levels for the future, the various authorities who had bridges to build in the district were asked to comply with the district's regulations for such construction. Since that time plans for about 50 bridges have been submitted to engineers of the district for approval.

Excellent cooperation has been given by state, county and city authorities, by railroad companies and others in connection with this work. In most cases inquiries as to requirements are made before plans are started, thus avoiding unnecessary delay later on. The district does not attempt to limit types of bridges, or to prescribe or check details of design except in special cases. Requirements, recommendations and approval are usually limited to area of waterway, elevation of underclearance, length of spans, location and alignment of piers and abutments, depth of foundations and bank protection adjacent to abutments. Thorough and complete rainfall and runoff studies were made during the planning period of the district's history and have been continued since, so that it became a comparatively simple matter to lay down the requirements for a bridge at any location in the district.

Since the floodflow below the dams in this district has been reduced in volume the brdige openings required in such locations should generally be smaller than formerly; in many cases, however, the former openings were so inadequate that even with the reduced flood conditions larger openings are now required.

Many of the older bridges were not expected to pass the entire floodflow. They were built high enough to be above maximum flood level, but the road on one or both sides was kept down and expected to be subject to overflow in larger floods. During the modern era of roadbuilding some of these roads have been or are expected to be raised, thus reducing the overflow area and necessitating a larger bridge opening.

On most of the older bridges the piers and abutments are placed at right angles to the center line of the bridge regardless of the direction of the stream. This often resulted in unnecessary obstruction to flow. In determining the direction or skew of the piers and abutments it has to be borne in mind that the direction of the stream in flood is not always the same as in low water.

Fig. 1 shows on the right a railway bridge with its piers at right angles to the bridge alignment, and on the left a highway bridge built since the organization of the district, in which the piers are on a skew of 18 deg. 32 min. and so placed that they will be in the direction of high-water flow from the piers of the railroad bridge. This highway bridge, incidentally, illustrates a recent development in bridge design, which is the use of very narrow piers with continuous-girder spans. The piers for this bridge are 5 ft. 9 in. thick at top of footing and 4 ft. at top of pier shaft. The spans are 100 ft. long.

Shape of piers

One matter given special consideration was the shape of piers. Many of the older structures have shapes of footings and piers that result in a great deal of turbulence and resistance to the flow. Based on experiments (*Transactions*, Am.Soc.C.E., LXXXII, p. 334), the shape of pier shown in Fig. 3 was designed and has been used on all bridges approved in the district.

The 1913 flood in the Miami Valley showed that scour occurs to great depths in the gravel beds of such streams as exist there. Many of the older piers were not carried to a sufficient depth and failed by underscouring.

FIG. 2—MANY FAILURES similar to the one shown here occurred in the Miami Valley in 1913 due to failure to recognize that in time of flood the river will enlarge the openings between piers by scouring.

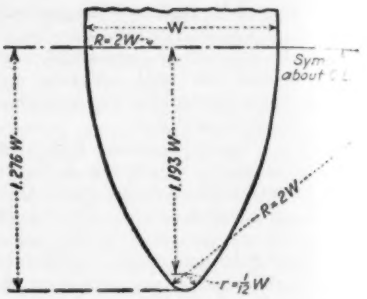

FIG. 3—BRIDGE PIERS coming under the direction of the Miami Conservancy District are built to the design here shown, to minimize their effect upon streamflow.

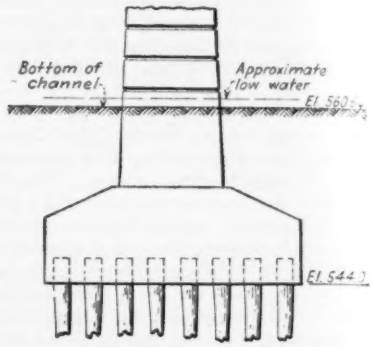

FIG. 4—TO AVOID undermining due to scour, the pier foundation design here shown is used in the gravel stream beds common in the Miami Valley.

A deep footing, usually on piling, therefore is one of the important requirements. Fig. 4 illustrates the depth to which footings are carried, not to reach material with greater bearing power but to prevent scouring under them. This pier is in an improved channel with concrete revetment on both banks where, in a maximum flood, an average velocity of 12 ft. per second or more may be expected. The streambed consists of well-graded gravel.

It is a notable fact that in many of the smaller political subdivisions little importance is placed on the necessity of study and investigation for the purpose of determining maximum flood discharges. A few high-water marks are obtained from evidences on the ground or from the memory of older inhabitants, or the waterway is calculated from some well-known formula. In some cases not even that is done, but it is simply assumed that if a bridge or culvert has not been destroyed in the past, it will be safe for the future and is rebuilt with the same or even smaller waterway; or if the bridge has been destroyed, the waterway is arrived at by examining other structures on the same stream. In any case the method of procedure is usually not thoroughly scientific. It seems ridiculous that one authority should build a bridge adequately designed as to waterway, foundations, etc., and that another should

build an inadequate structure on the same stream in the same vicinity. State highway departments, railroad companies and larger cities give more consideration to this subject, but even these often are not able to give the attention really necessary because they do not have adequate records and are not provided with the necessary appropriations and other means to make the required investigations, or because those in authority do not realize the need.

Because most of our bridges are on public highways or streets they are of great importance to the public, and if not properly built they become a public menace. For this reason there should be a central authority, either state or national, to pass on the plans of bridges or other waterway openings as to those features that are dependent upon weather, climatic and geological conditions. Such an authority should have the means to collect, tabulate and coordinate the data held by the U. S. Weather Bureau, the U. S. Geological Survey and other national, state or local organizations, to disseminate this information among those requiring it and to enforce compliance with its regulations.

Probably in most cases, legislation would be necessary to establish an authority of this kind.

Liner Plates Carry Fills in Undertrack Tunneling

Construction of three tunnels under railroad tracks in Indiana, Richmond and Dallas involved varying uses of pressed-steel plates to hold the fill until permanent lining could be placed—Hand-jacked shield used in one tunnel

PRESSED-STEEL liner plates played an important part in the construction of three widely separated drainage structures under multiple railroad tracks, all completed last year. Near Palmer, Ind., a tunnel replacing an old timber trestle and a stone arch on the Erie Railroad was driven with a hand-jacked shield in which complete rings of plate lining were erected, followed by a reinforced-concrete lining. As part of the Bacon Quarter Branch relief sewer in Richmond, Va., a tunnel was driven under fourteen tracks of the R.F.&P. Railroad by keeping the heading face breasted and braced against I-beam struts caught on structural ribs of a steel-plate lining. This tunnel was later lined with four courses of brick. At Dallas, Texas, original plans to carry the Mill Creek diversion storm sewer under several railroad tracks in open cut were changed by the contractor to a tunnel, with steel-rib reinforced liner plates supporting a flat-arched roof. The finished structure includes a heavy reinforced-concrete lining.

Though the pressed-steel plates were used on all three tunnels, construction methods varied greatly. The three jobs illustrate the adaptation of steel lining to widely differing conditions.

Open shield under Erie Railroad

The original single-track line of the Erie Railroad was carried over a drainage ditch known as Stony Run, near Palmer, Ind., on a 14-ft. stone arch 100 ft. long. When this section of the line was double-tracked in 1916, plans called for extending this arch structure in concrete for the second track. But when the second track was built, an unstable soil condition was found to exist for about 600 ft. along the original railroad embankment in the vicinity of the creek. When the new fill was partly made, a slide of considerable extent developed. After futile efforts to control the sliding by applying an earth blanket at the foot of the proposed embankment, plans were changed to carry the second track over Stony Run on a temporary timber and pile trestle. The service life of the temporary trestle had been attained in 1932, requiring that it either be renewed or replaced. In the past few years the old stone arch showed signs of distress because of foundation settlement, making replacement of the structure desirable.

After considering several types of structures to accommodate the stream crossing, the railroad company elected to construct a circular reinforced-concrete tunnel 12 ft. in diameter, located 100 ft. west of the old stone arch, where the ground appeared from borings to be more favorable. This tunnel was driven through sand, yellow and gray clay, the flow line of the culvert being 44 ft. below track level. Approach and discharge channels were cut to divert the stream to the tunnel and back to its original bed. The tunnel, 172 ft. long, is 16 ft. in outside diameter, with a reinforced-concrete lining 2 ft. thick, except at the invert where the thickness is increased to 2 ft. 9 in. (Fig. 1). The reinforcement consists of concentric rings

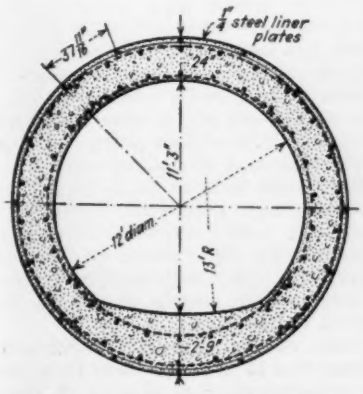

FIG. 1—DRAINAGE TUNNEL at Palmer, Ind., for Erie Railroad, in which an open shield and pressed-steel liner plates were used.

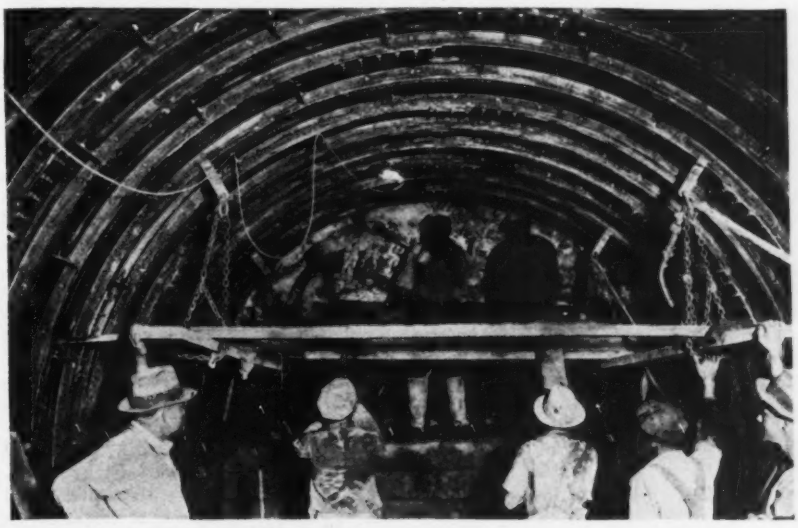

FIG. 2—BACON QUARTER STORM SEWER at Richmond, Va., driven under several railroad tracks with the aid of pressed-steel liner plates.

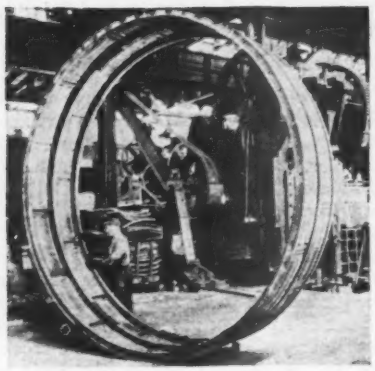

FIG. 3—STEEL-PLATE LINING for the Richmond sewer was reinforced with 4-in. I-beam ribs set between each pair of plate rings.

of ¾-in. rods spaced 6 in. c. to c. and longitudinal ¾-in. rods spaced 18 in. c. to c. near both the inside and outside faces of the concrete lining. Head and wing walls have been placed at both ends of the tunnel.

Borings showed groundwater at an elevation 6 ft. above bottom of excavation for the tunnel. Considering the unstable ground conditions in the vicinity, the contractor chose to use a well-point system and pumps to lower the groundwater level below the excavation. Yellow and gray clay was underlaid by a stratum of gray water-bearing sand, 4 ft. deep at the south portal, but thinning out to below the bottom of the tunnel 70 ft. north.

After the tunnel was completed and the water turned through it, the old arch was filled, the trestle removed, and the embankment completed. A consideration of the characteristics of the underlying black clay, as found by experiment, determined the design of the new fill to replace the trestle, and a blanket of sufficient extent and weight was provided before the fill proper was made, which prevented any slide or lateral movement.

The tunnel was driven from the downstream (south) portal from a pit 20 ft. deep, sunk before the discharge channel was excavated. An open shield was used, 16 ft. 2 in. inside diameter, made up of ¾-in. steel plates, stiffened with three 10-in. I-beam rings welded to the inside circumference. At first the shield was 10 ft. long, but this length was difficult to handle because of the squeezing effect of the clay. It was cut down to 7 ft. in length, which removed one I-beam stiffener, and no further serious difficulty was encountered. The shield was shoved ahead by eight hand-operated 50-ton screw jacks.

Inside of the shield was erected a lining of pressed-steel plates, ¼ in. thick, 16 in. wide, and 37 11/16 in. long, with 2-in. flanges on all four sides. The plates were bolted together through holes punched in the flanges, sixteen plates being required for a complete ring. This circular tunnel lining was adopted as best suited to resist damage caused by unstable ground conditions.

The side of the pit was used to jack against until sufficient liner plates had been installed to allow 20 ft. of concrete lining to be placed; thereafter previously placed concrete lining took the jacking thrust. While no breasting of the heading was required, the advancement of the shield was delayed at times by sloughing in of material caused by vibration of trains passing overhead, and occasional excess skin friction was developed by the shield. Excavation was carried ahead of the shield and was kept slightly larger in diameter than the shield itself.

The greatest progress of the shield in one day was 6 ft. 10 in., with an average progress of 3 ft. 2 in. being made. The tunnel excavation was removed from the heading by wheelbarrows at first, and later by a car on a narrow-gage track. Material was dumped at the bottom of the pit into an elevating conveyor that transferred it to a spoil bank at the top of the shaft.

After a 20-ft. section of tunnel had been driven, excavation was stopped and that section was lined. A 20-ft. length of steel tunnel form was used except for the invert. The invert, without forms, was poured first, the rest of the section being completed in one pour. Concrete was mixed at the top of the pit and chuted to the bottom, where it was blown into the form by a 7-ft. concrete gun. Excavation was held up for 72 hours after completing a pour to allow the lining to set sufficiently to withstand shoving thrusts of the jacks.

The work was done under the jurisdiction of R. C. Falconer, assistant vice-president, and G. S. Fanning, chief engineer of the Erie Railroad. Plans and specifications were developed by F. A. Howard, engineer of structures, and A. M. Knowles, assistant engineer of structures. The field work was under the supervision of C. H. Splitstone, superintendent of construction, and W. R. Swatosh, assistant engineer. W. G. King was resident engineer, with E. C. Ackerly as assistant. The contract was held by the R. T. Belding Co., Chicago, with J. L. Markey, general superintendent, in charge.

Brick-lined sewer at Richmond

Two sections of tunnel were required to carry the Bacon Quarter Branch relief sewer in Richmond, Va., under fourteen tracks of the R.F.&P. Railroad. One section, 212 ft. long, extended under nine tracks and had a cover of 10½ ft. of filled ground from top of tunnel to bottom of rail. The second tunnel, 130 ft. long, extended under five more tracks with a cover of 11 ft. of filled ground over the top of the tunnel.

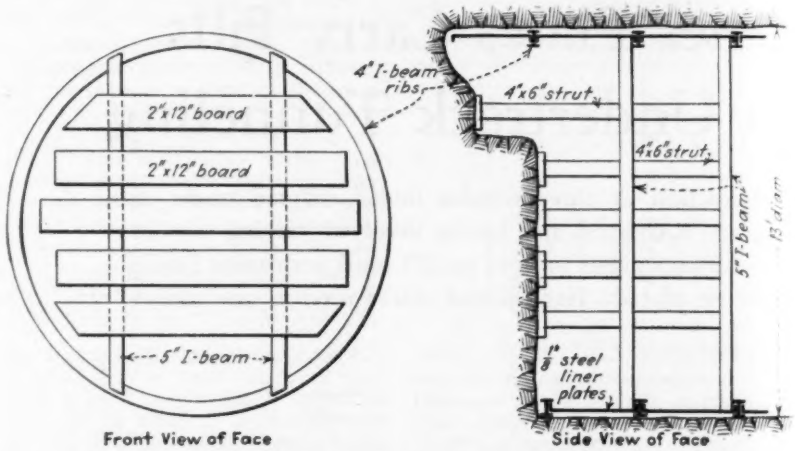

FIG. 4—BREAST BOARDS were braced against vertical beams caught by the lining stiffening ribs to support the face of the Richmond sewer.

The material encountered, from the top down consisted of a 2-ft. layer of fine sand with a small amount of clay, 4 ft. of gravel mixed with clay below this course, next a 5-ft. thickness of pure clay underlaid with fine white sand. Though all of the excavation was wet, a 6-in. drain pipe handled all of the water.

These tunnels were driven without the use of a shield (Fig. 2), and the face was kept breasted for most of the distance. The steel lining consisted of rings of 4-in. 9½-lb. I-beams 16 in. c. to c., between which were bolted one ring of ⅛-in. steel liner plates. The 2-in. side flanges of the plates were bolted through the webs of the I-beams. The I-beam rings were made up in three segments bolted together with splice plates on the inside flange. Web splices were also provided by the pressed-steel plates, which always overlapped the joints in the rings.

The outside diameter of the steel lining was 13 ft. 1½ in. After the tunnel was completed, four courses of sewer brick were placed within the shield, leaving ½ in. of mortar between the outside course and the steel plate. The final

inside diameter of the completed sewer is 10 ft.

The excavation was carried on as shown in Fig. 4. The plates were carried ahead one at a time, starting at the top, until sufficient plates were assembled to take care of two sections of the rib. The new rib was then placed, followed by completion of the ring of plates and the installation of a third section of the rib. In general, the top section of plates was carried ahead of the bottom section.

Where breasting was required, five horizontal 2x12-in. boards were used against the face, braced with horizontal 4x6-in. struts bearing against two vertical I-beam posts, which in turn caught against the inside flanges of the vertical rib. Excavation was taken out by hand, with the aid of pneumaitc spades, and loaded into a small dump truck, running over planks on the tunnel floor.

The work was handled by three crews on eight-hour shifts, and each crew consisted of one foreman, one truck driver and truck, and six laborers. The average progress was nine rings, or 12 ft. of tunnel, per day of 24 hours.

This design of lining, with the heavy stiffening ribs, adequately held the ground until driving was completed. Placing of the brick lining was started after all tunneling had been finished.

T. L. Cockrell, chief of the bureau of sewers and bridges, city of Richmond, was in charge of the work. The contract was held by the Robert G. Lassiter & Co., Raleigh, N. C., with A. W. Vinton as superintendent in charge.

Flat arched roof at Dallas

As part of the comprehensive storm-sewer system for Dallas, Texas, (*ENR*, Feb. 16, 1933, p. 216), the Mill Creek diversion storm sewer extends for about a mile under the industrial district, crossing several railroads, passes under the east levee, and empties into the Trinity River. The upper and lower ends of the Mill Creek sewer consist of a 16-ft. horseshoe section of heavily reinforced concrete built in open cut, connected with a 14-ft. tunnel in solid rock.

Immediately adjacent to the lower end of the rock tunnel the sewer line passes under several railroad tracks. Because of the expense and trouble of temporary bridges to carry the tracks and the great depth of railroad fill, averaging 25 ft., the contractor elected to build an additional 175 ft. of sewer in tunnel, retaining the same section as designed for open-cut work (Fig. 6).

The top of the arch of the open-cut design structure has a rise of only 4 ft. in a span of 19½ ft. With a cover of 5 to 8 ft. of clay, surcharged by the railroad fills, the tunnel penetrated materials varying from wet clay and sand at the top, through 18 in. of broken shale and limestone down through solid Austin chalk that rested on limestone. The top thickness of clay and sand averaged 3 ft.

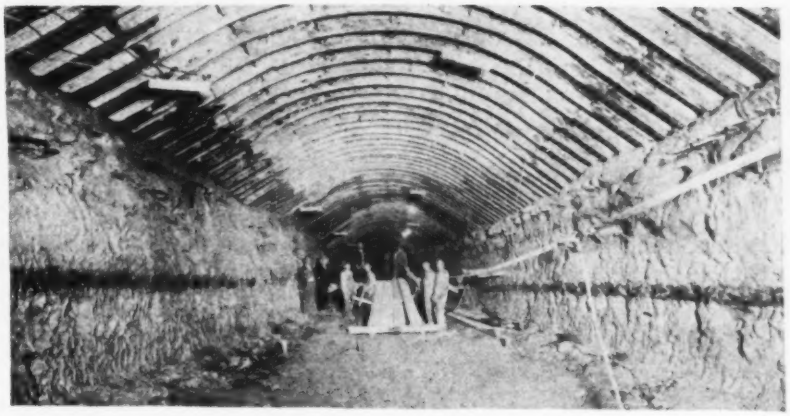

FIG. 5—A STEEL CANOPY of plates and I-beam ribs carried the roof of the Mill Creek sewer in Dallas under a group of railroad tracks. This section is ready for concrete lining.

The heading and bench method of tunneling was selected as best suited for the type of material encountered. The formation of material was such that for the most part the end of the roof supports would rest on solid rock. Advantage was taken of this condition to design a combination steel rib and steel liner plate roof protection. The flat arch ribs consisted of 5-in. I-beams fabricated in two sections. Between these I-beam ribs were erected rings of pressed-steel plate 16 in. wide, bolted through the webs of the beams (Fig. 5).

A top heading, 6 ft. high at the center and about 2 ft. high at the sides, was driven first through the entire length of the tunnel. The heading was advanced not over 20 in. at a time. When the heading had advanced far enough to permit placing another I-beam rib, the rib was set up and held in place by a trench jack. At the lower ends of the ribs steel bearing plates had previously been welded. These bearing plates were set in pockets cut out of the rock and were encased in concrete. After the concrete had set, a ring of pressed-steel liner plates was bolted between the last two ribs placed. An average of three rings per day, or 4 ft. of tunnel, was made in driving the heading with a crew of seven men.

After the top heading had been completed, the remainder of the rock was taken out in two benches carried together, with about 8 ft. of tunnel being pulled per round. The two benches were shot at the same time, using fuses and varying the delay of each charge by different lengths of fuse. The muck was removed and loaded by a scraper-type mucker loading directly into 1¼-yd. side-dump cars. From the portal the cars were hauled up a ramp by a hoist and cable and then shunted to a switch track by gravity and dumped. Both the mucking machine and the cars operated on a narrow-gage track.

A 27-E paver equipped with a hopper and belt conveyor was placed at ground level beside the portal opening. Concrete was discharged to the invert level

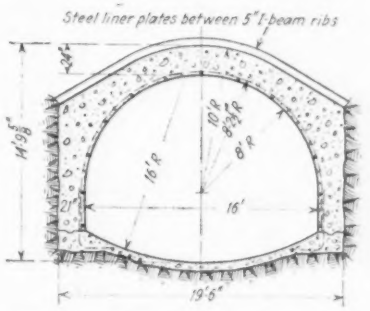

FIG. 6—SECTION of Mill Creek diversion sewer, Dallas, built under several railroad tracks; steel liner plates provided roof protection.

through flexible spouts. Concrete for the invert was handled in small dump cars, and that for the arch and walls was placed by a pneumatic gun. Three sections of 15-ft. steel forms rode on a wide-gaged track.

An interesting sidelight on this job is that the entire plant was powered by natural gas. Gasoline engines operating the compressors, ventilation fans and hoists were equipped with special carburetors to permit use of the natural gas.

Engineers and contractors

The Dallas sewer program is being handled by John N. Edy, city manager, and O. H. Koch, director of public works. W. W. Horner, St. Louis, is consulting engineer. P. C. Sorenson Co., Detroit, had the contract for the Mill Creek sewer in combination with the R. D. Baker Construction Co., of Detroit. P. C. Sorenson and Russell A. Anderson were in charge of the tunnel work. The Lindh, Gustafson & Klopfer Co., Grand Rapids, was subcontractor on the concrete work.

On all three of these tunnels the steel-plate lining was planned to meet local conditions by the tunnel liner division of the Truscon Steel Co., Youngstown, Ohio, under the direction of A. Foukal, manager.

Book Reviews and Notes

A monthly Commentary on Current Additions to the Civil Engineer's Library

British Coast Protection Works

COAST EROSION AND PROTECTION—By the late Ernest R. Matthews, with revision by Brysson Cunningham. Third edition. Cloth; 6x9 in.; pp. 228; photographs and line drawings. Published by Charles Griffin & Co. Ltd., London, and J. B. Lippincott Co., Philadelphia. $6.

Only minor revisions have been made in this book since it was first published in 1913. Hence it is of value chiefly as a historical record of coast erosion and accretion around the coast of Great Britain and of the massive structures built to check the heavy attacks of the sea upon those coasts. Coast-protection work in this country is not described. The chapter on "Recent Practice" added by Mr. Cunningham is devoted chiefly to bringing up to date the information relating to a few of the principal works described in the first and second editions. Except for brief notes on two projects in Europe no recent developments in coast protection are covered.

American Housing Analyzed

THE EVOLVING HOUSE—Vol. I. The History of the Home, by A. F. Bemis and J. Burchard, 2nd; Vol. II, The Economics of Shelter, By A. F. Bemis; (Vol. III not yet published). Cloth; 6x9 in.; pp. 502 and 605; numerous line drawings, diagrams and tables. Published by the Technology Press, Massachusetts Institute of Technology, Cambridge, Mass. Individual volumes, $4 each, set of three volumes. $10.

The first volume of this three-volume work recounts the evolution of the home as it has been affected by social and economic forces from prehistoric times. The second volume concerns today's housing problem, while a third volume promises a solution in the form of a rationalization of the housing industry. In Vol. II, the first section is concerned with the importance of housing relative to other economic factors and with the development of the fact that housing costs too much. In the second section the reasons for the high cost are analyzed by considering separately the inefficient organization of the building industry, the cost of land, the cost of building, the cost of financing and the cost of architectural service. The final section discusses governmental efforts, here and abroad, to improve minimum housing in quality and cost. The author concludes that government subsidy does more harm than good. The second volume contains a remarkably complete statistical picture of American housing, its existing conditions and trends and its relation to and comparson with other industries and their methods. Interwoven with the figures and charts is the development of the author's thesis that housing costs too much and, that while many factors are involved the one which requires immediate remedy involves the physical structure. Houses must be developed to serve modern social needs, and they must be adapted to modern means of mass production. Mr. Bemis, the author, is a civil engineer who has taken an active and nearly lifetime interest in housing, having designed and built a number of experimental units.

A New Handbook

CIVIL ENGINEERING HANDBOOK—By Leonard Church Urquhart. Flexible; pp. 885; diagrams, tables and photographs. Published by McGraw-Hill Book Co., Inc., New York and London. $5.

SETTING himself a distinctly new purpose, the author of Urquhart's handbook departs from the traditional course that was marked out by the original Trautwine and that reached its most thorough development in the Merriman handbook. Professor Urquhart directs himself primarily to the engineer who has to deal with a problem outside his specialized field, and who therefore seeks preliminary guidance in a compendium of condensed information. The attempt to serve this purpose within the scope of less than 900 pages necessarily placed limits to the thoroughness with which the desired end could be attained.

Some of the reduction of space as compared with earlier handbooks is accomplished by omission of the usual tables—which the present-day working engineer has (or should have) at hand in other form. Partly by virtue of this timely change the author found it possible to extend his treatment into condensed textbook form, as in giving some 60 pages to roof and bridge trusses. This conforms to a secondary purpose of the author, which is to make the work adaptable for use as a textbook in undergraduate classes. In a number of subjects, however, the book will not be found to serve its avowed purpose effectively, as in the design and construction of dams. Here the seeking for brevity has resulted in limiting the subject to eight pages, in which the important field of masonry dams is covered by but 22 lines; buttressed dams are not even mentioned, nor is anything said about the extensive subject of arch-dam design.

Aiming to cover so wide a field as that of civil engineering, a first edition must be expected to show some omissions. Among those noted in the present work are navigation canals, docks and wharfs, tunnels, water power, cantilever and suspension bridges, movable bridges, viaducts and trestles. For best use of the work the reader will therefore find it advisable to familiarize himself with its scope, which is decidedly less extensive than the field denoted by the title.

Water Works Practice in Great Britain

Reviewed by M. N. Baker
Upper Montclair, N. J.

WATER SUPPLY PROBLEMS AND DEVELOPMENTS—By W. H. Maxwell. Cloth; 6x9 in.; pp. 254; photographs and diagrams. Published by Sir Isaac Pitman & Sons, Ltd., London, and Pitman Publishing Corp., 2 W. 45th St., New York. $6.

WITHIN the limits set by Mr. Maxwell, his "Water Supply Problems and Developments" is a useful and up-to-date review of British practice. American members of the waterworks fraternity will find in it much interesitng information.

The first thirty pages of the book are on water supplies in relation to public health and on water analyses and their interpretation. Then come forty pages on advances in modern purification methods and four chapters on pumps and pumping stations. Reference is then made to water treatment in a chapter headed "Mechanical Filtration, Water Softening, Flocculation, and Sedimentation." The final chapter, "Some Water Supply Accessories," deals with various appliances, materials and methods, mostly outside the topics considered in the body of the book.

The two chapters on water treatment contain some information that will be new to most American waterworks men, chiefly details that might or might not be useful in practice here. Among a few citations of American water-treatment practice there is an outline of a "fully up-to-date" plant, curiously enough located at "Easton, Philadelphia"—two Pennsylvania cities 50 miles apart.

Of the chapters on pumps, one is a general review of various kinds of pumps; one is on "boosting systems," and two describe installations for which the author was engineer.

The final and longest chapter in the book ranges over a wide field of waterworks equipment and materials. A few of the topics are: electrical recoating of water mains, "by means of a colloidal suspension of bitumen and fusing suitable electric current through it"; spun cast-iron pipes; asbestos cement pressure pipes; concrete-lined pipes (cement-and-sand); valves and hydrants; mechanical filter equipment; tellurium lead service pipes; and last but not least well-boring chisels up to 10 ft. in diameter. Here, as elsewhere through-

out the book, the pages bristle with trade names and the names and addresses of manufacturers of proprietary devices and materials. This may be a service to some readers but gives the impression of a consolidated trade catalogue. This is an unpleasant feature of other British books in the field of municipal sanitation.

Miscellaneous Notes on Booklets and Reprints

THE REPEATED-STRESS (fatigue) testing machines used in the materials testing laboratory of the University of Illinois are described in circular No. 3 of the Engineering Experiment Station, Urbana, Ill. Price 40c.

A TEST ON A FLOOR made of flat steel plates is reported in Research Paper RP662 of the Bureau of Standards, U. S. Department of Commerce. This paper is to be included in Vol. 12 of the Bureau of Standards' *Journal of Research.*

PURIFICATION OF CREAMERY WASTES on filters and the effect of bottom ventilation on purification by experimental trickling filters are the subjects of Bulletin 115 and 116, Iowa State College of Agriculture and Mechanic Arts, Ames, Iowa. Price not stated.

A SUMMARY of present knowledge of the chief mineral resources and of the engineering geology of the Tennessee River Valley and tributary regions is given in Geologic Bulletin No. 1, General Engineering and Geology Division, Tennessee Valley Authority, Knoxville, Tenn. Price not stated.

SKIDDING CHARACTERISTICS of road surfaces and the coefficient of friction between tires and road surfaces are listed in a preprint of the *Proceedings* of the thirteenth annual meeting of the Highway Research Board, 1933. This paper was noted in our report of the meeting of the board published Dec. 14, 1933, p. 722.

SNOW CONTROL ON HIGHWAYS, a study of the drifting of snow and the determination of the effect of various types of snow fences and snow barriers, is the subject of Bulletin No. 57, Michigan Engineering Experiment Station, Michigan State College of Agriculture and Applied Science, East Lansing, Mich. Price, 25c.

OCEAN SHORELINES as represented by Barnegat Inlet on the New Jersey Coast are outlined in a 54-page pamphlet written by John B. Lucke, following an intensive study of the region and presented to the faculty of Princeton University as a thesis for a Ph.D. degree. The history of this typical tidal inlet on a shoreline of emergence is deciphered by means of old records and sedimentary field data. The sediments of the tidal delta are analyzed according to grain size, minerals and micro-fossils, and the field and laboratory technique are explained. The data presented confirm the assumption that the tidal delta is composed of debris carried by longshore currents and deposited in the lagoon by flood tidal currents. A new theory of an orderly evolution of lagoon deposits is presented, namely, that tidal inlets may produce distinctive deposits in the lagoons, a study of which may aid in deciphering shoreline history. The pamphlet is available from the American Shore and Beach Preservation Association, First National Bank Building, Jersey City, N. J.

New Books and Revised Editions

[Those desiring copies of the books listed below or mentioned elsewhere in this section should order them from the publishers or from their local booksellers.]

ANALYSIS OF CONTINUOUS FRAMES—By Earle Brewster Russell. Second Edition, revised and enlarged. Paper; 6x9 in.; pp. 73; diagrams and tables. Published by Ellison and Russell, San Francisco.

APPLIED HYDRAULICS—By Herbert Addison, Royal School of Engineering, Giza, Egypt. Cloth; 6x9 in.; pp. 409; photographs, tables and diagrams. Published by John Wiley & Sons, Inc. New York. $5.50.

FESTE STÄHLERNE BRÜCKEN—By G. Schaper. Paper; 7x10 in.; pp. 540; diagrams and photographs. Published by Wilhelm Ernst & Sohn, Berlin, Germany. 36 RM.

FIRST AID FOR THE AILING HOUSE—By Roger B. Whitman. Cloth; 6x9 in.; pp. 320; illustrations. Published by Whittlesey House, McGraw-Hill Book Co., Inc. New York. $2 . . . *A classified compilation of information developed in answering questions addressed to the editor of a column headed "First Aid for the Ailing House" in* THE SUN, *New York.*

FIVE PLACE TABLES OF NATURAL TRIGONOMETRIC FUNCTIONS TO HUNDREDTHS OF A DEGREE—Compiled by Ameria De Lella. Paper; 8x10 in.; pp. 50. Published by John Wiley & Sons, New York, $1.

THE INDUSTRIAL UTILITY OF PUBLIC WATER SUPPLIES IN THE UNITED STATES, 1932 — Geological Survey Water Supply Paper No. 658. Paper; 6x9 in.; pp. 135. For sale by the Superintendent of Documents, Washington, D. C. 15 cents . . . *Contains a 98-page table giving chemical constituents of water supplies of 670 cities.*

LOGARITHMS NUMERICAL AND GRAPHICAL—By N. R. Corke. Cloth; 8x11 in.; pp. 79; diagrams and tables. Published by Gee & Co. Ltd., London. 9s. 3d . . . *A discussion of the use of logarithms in calculating with slide rules, in plotting with log paper and in nomographs.*

LOKALTRAFIKENS Ordnande I Stockholm—Prepared by Stadskollegiets Utlatanden: 1934, Nr. 10A, 10B, 10C. Paper; 6x9 in.; pp. 341; numerous tables and folded charts and maps. Published by the Swedish government, Stockholm, Sweden. Price not stated.

MATHEMATICAL TABLES—By Howard Chapin Ives. Second Edition, Flexible; 4x7 in.; pp. 160; diagrams and tables. John Wiley & Sons, New York. $1.50. . . . *Reprinted from Searles & Ives Field Engineering, with additions.*

MEMORIA DE CANALES DEL LOZOYA: 1929—By D. Severino Bello Poëyusan. Paper; 7x10 in.; pp. 187; line cuts, photographs and tables. Published by El Ingeniero Director de Canales del Lozoya, Saluda, Madrid, Spain.

MEMORIA DE CANALES DEL LOZOYA, 1930, 1931 and 1932. By D. Severino Bello Poëyusan. Paper; 6x9 in.; pp. 583; photographs, tables and line cuts. Published by El Ingeniero Director de Canales del Lozoya, Saluda, Madrid, Spain.

NATIONAL PHYSICAL LABORATORY REPORT FOR THE YEAR 1933. Paper; 8x11 in.; pp. 264; photographs, diagrams and tables. Published by His Majesty's Stationery Office, London, and British Library of Information, 270 Madison Ave., New York. $3.50.

THE PORT OF NEW YORK—In Three Parts: Part I, General Report; Part II, Piers, Wharves and Docks (statistical data); and Part III, Atlas of Port Facilities Maps. Prepared by the Board of Engineers for Rivers and Harbors, War Department, in cooperation with the United States Shipping Board (Port Series No. 20). Paper. Part I, 6x9 in.; pp. 376. Part II, 6x9 in.; pp. 671. Part III, 6x9 in.; 56 plates; halftones, plates, charts and tables in Part I, statistical tables in Part II. $2.55 from Superintendent of Documents, Washington, D. C.

THE PORTS OF SAN FRANCISCO, OAKLAND, BERKELEY, RICHMOND, UPPER SAN FRANCISCO BAY, SANTA CRUZ AND MONTEREY, CALIFORNIA—Port Series No. 12 (revised 1933). Prepared by The Board of Engineers for Rivers and Harbors, War Department and Bureau of Marine Development, United States Shipping Board. For sale by the Superintendent of Documents, Washington, D. C. 65c.

PRACTI AL DESIGNING IN REINFORCED CONCRETE—Part II—By M. T. Cantell. Cloth; 6x9 in.; pp. 291; photographs, diagrams and tables. Published by E. & F. N. Spon, London, and Spon & Chamberlain, The Engineers Book Shop, New York. $4.50.

RAILWAYS AND ROADS IN PIONEER DEVELOPMENT OVERSEARS—By J. Edwin Holmstrom. Cloth; 6x9 in.; pp. 304; tables and diagrams. Published by P. S. King & Son, Ltd. London. 15s.

RED DE VIAS A BAJO NIVEL: EL TRAFICO EN BUENOS AIRES—By Pascula Palazzo. Paper; 6x9 in.; pp. 87; tables and diagrams. Published by Talleres Graficos A. Baiocco & Co., Buenos Aires, S. A.

SHORT LESSONS ON ENGINEERING AND ARCHITECTURE—By Francisco Gastón. Cloth; 4x7; pp. 140; tables. Published by the author, Havana, Cuba . . . *a group of brief statements on engineering and architectural subjects designed to give Cuban students familiarity with engineering and architectural terms as used in the English literature on these two subjects.*

SURVEYING: VOLUME II, HIGHER SURVEYING—Charles B. Breed and George L. Hosmer. Fourth Edition, Fabricoid; 5x7 in.; pp. 597; maps, tables and photographs. John Wiley & Sons, Inc., New York. $3.50.

SURVEYING—By Raymond E. Davis, Francis S. Foote, W. H. Rayner. Second edition. Fabricoid; 5x8 in.; pp. 1032; photographs, tables and diagrams. McGraw-Hill Book Co. Inc., New York. $5.

TECHNICS AND CIVILIZATION — By Lewis Mumford. Cloth; 6x9 in.; pp. 495; numerous halftone illustrations. Published by Harcourt, Brace & Co., New York. $4.50.

TEXT BOOK ON HYDRAULICS — By George E. Russell. Fourth Edition. Cloth; 6x9 in.; pp. 447; photographs, diagrams and tables. Published by Henry Holt and Company, New York. $3.90.

THEORY OF SUPERSTATIC STRUCTURES—By J. D. Gedo. Paper; 8x11 in.; pp. 98; tables, folding diagrams. Published by the author, 205 E. 42d St. New York, N. Y. $1.50.

ZIELSICHERE BETONBILDUNG — By Ottokar Stern. Paper; 6x9 in.; pp. 96; plates, photographs and tables. Published by Julius Springer, Berlin. 5RM.

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August 30, 1934

Proof of Municipal Credit

CONVINCING EVIDENCE of the readiness of the private investment community to provide funds for useful improvements, provided the bonds are sponsored by some governmental agency, is presented by the bids received last week by the RFC on a list of state and municipal securities taken over from the PWA. Substantial premiums were bid for every offering, which, with one exception, carry a coupon rate of 4 per cent. This repeats the success of the PWA itself when a half year ago it marketed, also at a premium, a block of its municipal holdings. Unlike the former sale, whose proceeds reverted to the federal Treasury, the present transaction will reimburse the PWA for its advances to state and local governments, thereby making further funds available for reallotment for public-works construction. Thus the private investor, through the intermediation of federal agencies, again takes up his function of financing public construction. There is an abundance of money seeking investment, but it demands a measure of security that private business as yet cannot provide. Until investors regain confidence in the safety of their loans to business enterprise, governmental bonds must remain the chief repository for the savings of the nation.

A Demonstration of Faith

IT IS IMPOSSIBLE to review what has been done in straightening the Mississippi River by cutoffs in a period of less than two years without being impressed by the fact that the work is a notable demonstration of faith in the accuracy of the results obtained from the studies made in the Waterways Experiment Station at Vicksburg. Since January, 1933, seven cutoffs have been opened. With the Yucatan Point cutoff that opened naturally in 1929, these cutoffs will shorten the river by 70 miles. Some of the cutoffs now take the major part of the flow of the river; others take only a small part of the flow pending the time when a major flood will provide the scouring force necessary to deepen and enlarge the channel. The significance of such an extensive program of cutoffs becomes apparent when it is realized that for more than 70 years the belief that the formation of cutoffs should be resisted to the utmost has dominated river-control work on the Mississippi. The principles that grew out of that belief now are under searching question, and the resulting change of engineering procedure is on so large a scale that the outcome is bound to be conclusive as to most of the critical problems involved. Local conditions peculiar to the site might affect the results at a single cutoff, but with eight cutoffs open and the river shortened by 26 per cent of its length between the mouth of the Arkansas and the mouth of the Red River, it appears certain that any errors in the new thinking will be made evident. The commission's engineers, therefore, in their present undertakings are giving ample evidence of their faith in the conclusions drawn from their studies and in the effectiveness of their operations.

Robbing Peter Once More

HIGHWAY FUNDS are again being surveyed with speculating eye by legislatures and state administrations which are beginning to receive the budgets of relief organizations for the coming winter. Obviously, relief is necessary, the hungry must be fed, the naked must be clothed, and the roofless must be given shelter, but why should the automobile owner be selected as the one class of taxpayer who should pay the entire unemployment-relief costs? The answer, of course, is that unless money is taken from motor-vehicle tax income, legislatures must levy more taxes, and legislatures and governors are constitutionally timid about taxes. Theft of highway funds is much less likely to cause undesired political reactions, and unless the highway transportation interests take action to defend these obligated revenues the winter's record of breaking and entering will exceed the bold robberies of 1933-34. With next summer the strong arm of federal law will have reached out to check diversion, but until then free federal grants leave the door wide for free grabs by the states. In the meantime the taxpaying public would do well to reflect on the fact that these grabs only make the relief burden greater; the money withheld from wage-producing highway work will put more families on relief, and when paid to them in the form of doles it creates no permanent value but leads to further pauperization instead.

Indigenous Bridges

TO MAKE the short-span bridge pleasing in appearance is one of the most difficult problems confronting the designer. The growing demand that a bridge be something more than a utilitarian structure, coupled with the large increase in the number of small bridges, has concentrated more attention on this somewhat perennial design problem than ever before. Three recent examples suggest that one solution may lie in seeking to make bridges harmonize with their surroundings. The New Mexico highway department has recently opened its first rigid-frame bridge and has given it a striking appearance by finishing its fascia frames and parapets in the local Pueblo style. Vermont, on similar structures, has used for facing the several colored granites for which the state is famous. And in Oregon, the home of a great lumber industry, state bridge engineers have developed some remarkably pleasing timber and composite timber-concrete bridges. Carried too far and followed with too great abandon, the idea of an indigenous architecture for bridges could easily produce absurd results, such as bright-colored tile facing in Southern California to simulate Spanish patio effects, or exposed seashell aggregates in Florida. But granted good taste and conservatism on the part of the designer, bridges indigenous to their locality would seem to offer opportunities. In the three states cited, the results achieved command respect.

Roads for Recreational Service

LONG ISLAND'S splendid system of parkways, currently under development, is most often compared with the well-known Westchester County parkways north of New York. Physically, the Long Island system is a direct descendant, but basically it is quite different from the pioneer parkways of Westchester County and, in fact,

introduces an altogther new type of highway. The Long Island parkways are recreational roads, as distinct from traffic arteries. They are roads to nowhere as compared with trunk highways whose function is to connect towns and cities. Indeed, a group of trunk highways parallels these parkways. True, the parkways provide access to a group of state parks, notably the Jones Beach development described in this issue, but these parks are merely stopping places or recreational oases along the route. Roads devoted to pleasure driving are not unknown, but previously they have been confined to such locations as national forests or to city or national parks. Denver made a notable pioneer effort in this direction many years ago, with its famous serpentine road up Lookout Mountain. But the Long Island parkway system, with nearly fifty miles of roads completed, imparts an entirely new meaning to the sign "For Pleasure Vehicles Only." That it may, in future years, be regarded as the beginning of a new type of highway development is altogether likely. Even now, in Virginia, North Carolina and Tennessee a recreation parkway is being built to connect Shenandoah National Park and the Great Smoky Mountain National Park. A skyline drive along the crest of the Green Mountains in Vermont is actively under discussion. Pleasure-road projects such as these seem to be indicative of a trend in highway development that may radically change the nation's road map.

Retreat from the Fair-Competition Principle

STRANGEST of the many confused developments that surround the NRA codes of fair competition in industry is the apathy displayed toward the recent Executive Order permitting bidders to any public agency to discount their filed code prices by 15 per cent. The order runs counter to the underlying spirit of the code system; instead of supporting fair competition it is a clear invitation to that unfair competition, the chiseling and business immorality, which the industrial recovery legislation sought to wipe out. Unless soon revoked it will mean the destruction of code regulation.

That the cut-price order has been largely ignored by the business public is suggestive of a significant loss of faith in the NRA. And in issuing the order the President himself took the lead in a retreat from the NRA and from the principle of fair competition and equitable dealing. Ruinous competition is re-established, and this, too, in more aggravated form than was known before the days of the NRA, since the competition which the order aims to bring about does more than violate the rule that below-cost bidding is lawless and immoral—it sets up discrimination between purchasers.

It is said that the order was issued with a view to relieving public agencies of the problem presented when various bidders submit identical prices in accordance with the mandate of their codes. This purpose was to be carried out by a chiseling process which, if practiced in private business, would brand the offender as a lawbreaker. In the nature of things, however, the effort was bound to fail, for whoever seeks to win a public contract will still endeavor to bid down to the level fixed by his lowest competitor, except that in place of bidding the publicly filed price he will bid 15 per cent below. Since governmental authorities are today the largest purchasers of many commodities, the direct effect of the order is to give these agencies a price advantage for which the private buyer must pay—a system so obviously inequitable as to destroy every shred of respect for the NRA's much-vaunted "law merchant," a law which the government itself honors in the breach.

The immoral nature of the order is clearly apparent in the field of construction where the direct competition of government with private industry especially calls for equity. The contracting and materials industries are most immediately affected; the ultimate reaction is certain to reach engineers as well.

That the materials industries are demoralized by the government's new chiseling practice goes without saying at a time when purchases for government use are almost their sole market. Contractors are as greatly affected, for when public officials have a 15 per cent advantage in the purchase of materials the only remaining function of the contractor is to act as construction manager and labor broker. Once this condition is established, only a short step remains to complete force-account construction by the government agency. This in turn means the virtual end of the contracting industry.

We do not believe that it is in the public interest to permit this great industry, keystone of the greater construction industry, to be destroyed, least of all to be destroyed by the injustice of price discrimination. Nor do we believe that the President or the NRA desires to destroy it. Nevertheless, their course in promulgating the cut-price order is effectively adapted to this very end. The issue is particularly urgent at the present time, when the very existence of contractors depends on public works, and when their place even in this field has been invaded by growing day-labor construction.

The CWA program of last winter, planned in good faith to embrace only such projects as were not suited to normal construction procedure, encroached on the field of contracting as it went along, until at its close many communities were carrying out their entire municipal work by this method. The FERA, successor to the CWA, continued this encroachment to the point where, as recently happened in New Jersey, a city rejects a PWA loan for waterworks improvements and proceeds to do the work by emergency relief labor, at no cost to the city beyond the price of materials.

Contractors already have suffered severely from these developments; and now, burdened with a 15 per cent surcharge in the purchase of materials, they are placed at a further disadvantage so grave that the contracting industry runs the risk of being wholly displaced by the day-labor system. The ready opportunities of the latter system for political exploitation and waste make the danger only the more imminent.

Even a cursory study of the cut-price order in relation to construction is sufficient to reveal its power for harm. Its gross unfairness doubtless affects many other industries, however. And this to no useful end, but, as already pointed out, to the inevitable destruction of the NRA and the industrial reform ideals on which it was founded. The executive order should be revoked at the earliest moment. If not revoked, it should be revised to apply to all sellers and buyers alike, so that the equity essential to fair business dealing may be restored to honor.

CURRENT NEWS

NRA Rushes Approval of Construction Code Divisional Budgets

INCREASED speed by NRA in pushing through to completion the approval of budgets, trade practice complaints committees and other measures for the various divisions of the construction code has been reflected in increased administrative and enforcement activity by divisional code authorities. The delay in entangling governmental red tape surrounding many important units in the administrative machinery of most of the divisional code authorities under the construction code has been a constant source of inconvenience and delay to those charged with the task of setting up the mechanism of code administration. The many boards and committees which deliberate over the terms of assessment methods, while admittedly of value, are seen from some sources as one of the reasons for slowness in initiating administrative facilities.

One of the reasons for the considerable delays in NRA is the uncentralized organization of the various bodies whose approval is necessary on the vital papers of the administrative agencies. It is expected that this condition will be remedied with the pending reorganization of the National Recovery Administration, although details are as yet lacking.

To clear up the confusion which has existed regarding exemptions from NRA codes in towns of 2,500 or less, General Johnson has issued an Administrative Order (X-72) specifically defining the trades and industries included in the phrase "Retail trade or local service trades or industries." A previous order has placed the members of these groups outside the provisions of applicable codes in towns of 2,500 or less which were not within the immediate trade area of a larger city.

In a supplementary statement, further defining this last administrative order, the NRA Administrator lists, among others, the construction code as being specifically excluded from the exemption. That is, the provisions of the construction code, including the various chapters, are in effect in towns of any size, and have officially been interpreted as not coming under the definition of retail or service trades.

Ten Large-Scale Federal Housing Projects to Start by Jan. 1

In discussing the PWA housing situation recently, Administrator Harold L. Ickes predicted that by Jan. 1, 1935, construction will start on two projects in Atlanta, three in Cleveland and one each in Cincinnati, Indianapolis, Montgomery, Louisville and Milwaukee. He also refuted charges that the PWA Housing Division had been virtually abolished since its reorganization in June. "The government," he said, "has no intention of abandoning or sidetracking its low-cost housing and slum-clearance activities."

New Recovery Committee Named By the Construction League

A National Construction Recovery Committee was named by the policy committee of the Construction League of the United States at its meeting held in Chicago on Aug. 18. Malcolm Pirnie, New York, will act as chairman. Names of the other members of the committee will be announced as soon as acceptances have been received from those tentatively selected at the Chicago meeting.

The new committee will be similar to the National Committee for Trade Recovery organized under the League's auspices in 1932. Its purpose will be to aid in formulating national policies in relation to the financing of public works as an aid to recovery and to help in overcoming opposition to such policies.

Ship Lock at Bonneville Dam Authorized; Allotted $1,200,000

The PWA has allotted $1,200,000 to provide a ship lock at the Bonneville dam and power development on the Columbia River, near Portland, Ore., following authorization by the War Department. The change in plan will provide a sea-lock with 27-ft. depth as compared to the barge lock with 15-ft. depth in the original plan.

By making the change at this time the deeper lock will add only $1,200,000 to the cost of the project, whereas the conversion at a later date would have cost $3,100,000. The change was recommended in a report by Col. T. M. Robbins, division engineer, as noted last week (*EN-R*, Aug. 23, 1934, p. 256).

Data From Utilities Requested For National Power Survey

Carrying out the instruction of President Roosevelt requesting a national power survey, the Federal Power Commission has sent out schedules for information to private and public utilities throughout the country. This survey, according to Basil Manly, vice chairman of the commission in charge of this study, will develop data on the "water resources of the United States as they relate to the conservation, development, control and utilization of water power, of the relation of water power to other industries and to interstate and foreign commerce; and of the transmission of electrical energy in the United States and its distribution to consumers."

The questions which have been sent to utility executives have been developed after extensive study and consultation with private and public power authorities. The schedules are considered comprehensive but do not include unnecessary questions, each item covering a point which is considered essential to a complete and accurate survey of the "generating systems, transmission lines, present capacity, development possibilities, and future demands."

Thomas R. Tate is the director of the national power survey, and Lester S. Ready is chief consulting engineer.

Drought in Northern New York Threatens Hydroelectric Power

Far removed from the Mid-West drought area, and in contrast to other sections of New York state, the Adirondack district is in the grip of a drought that seriously threatens the operation of several hydroelectric plants on the upper Hudson River, including the Spicers Falls plant, and numerous industries dependent on streamflow for power. Since the middle of January of this year the precipitation has fallen behind the average of the past nine years, accumulating a deficiency of 10 in. for the year on August 20. Total normal precipitation on this date is 29.55 in.

The value of the Sacandaga reservoir in the regulation of the flow of the Hudson River has been well demonstrated this summer. Created three years ago by the completion of Conklingville dam built by the Hudson River Regulating District, this reservoir provides 690,000 acre ft. of available storage on Sacandaga River just above its confluence with the Hudson at Hadley, N. Y. Power and industrial plants on the Hudson between Hadley and Troy require 3,000 sec.ft. for normal operation. With a drainage area of 1,550 sq.mi., the flow of the Hudson River at Hadley averaged 380 sec.ft. in July, and on Aug. 20 had dropped to 170 sec.ft. From a drainage area of 1,040 sq.mi. the inflow into the Sacandaga reservoir has been almost negligible during the spring and summer, dropping to 26 sec.ft. at present, far below the estimated loss of 140 sec.ft. by evaporation from the reservoir.

The deficiency in flow of the Hudson during the past months has been supplied by discharge from the reservoir to maintain the 3,000 sec.ft. required. Though the reservoir was well filled at the first of the year, steady withdrawal has lowered the storage to the point where the discharge must be greatly curtailed by Sept. 1 unless unusually heavy rains increase the flow in the Hudson.

Buyers Take Twin Cities Bonds at Lower Interest Than PWA Offer

Private bond bidders have offered higher prices for St. Paul and Minneapolis bonds to finance the Twin City sewage disposal project than were offered by the PWA. The PWA interest rate of 4 per cent has been reduced to about 3½ per cent as the result of the bids from private buyers. As a result of the private sale, PWA is able to reduce its $18,048,000 allotment for this project by $1,989,000 and release this financing for other projects.

Following usual practice, the PWA agreed to purchase the bonds of both cities at a price to make interest 4 per cent. With the offers of private buyers representing a substantial reduction in this interest rate, the PWA did not bid. On the Minneapolis bond offer, private bidders established a price which resulted in an interest rate of 3.5 per cent, and for the St. Paul bonds the bid resulted in an interest rate of 3.39 per cent.

National Water Resource Study Organized in Eight Regions

Organization of the national water resources study recently initiated by the new National Resources Board (*ENR*, Aug. 16, 1934, p. 221) has been completed with the appointment of regional engineers to direct the collection of data in each of the eight zones or regions into which the country has been divided for the purposes of the study. The regions and regional engineers are as follows: New England and North Atlantic west to the Great Lakes drainage and south to the Susquehanna watershed, H. K. Barrows, Boston; South Atlantic and eastern Gulf, from the Susquehanna River to the Mississippi drainage, Brent Drane, Washington; Great Lakes drainage, L. K. Sherman, Chicago; interior basin, Mississippi Valley Committee; western Gulf and Southwest to the Colorado River basin, O. N. Floyd, Dallas; California and the intermountain basin, W. L. Huber, San Francisco; Northwest States, including Idaho, Joseph Jacobs, Seattle. The Colorado river basin, eighth region of the group, will be covered by the water committee itself in cooperation with the Bureau of Reclamation and other government agencies.

Study of water resources thus organized has been progressing during the past month. A report on physiography and hydrology of the region in preliminary form is to be completed by the regional engineers early in September, and a further progress report on present utilization of the water resources by October. Based on these data the water committee is planning to complete its report on the water resources of the entire nation by Dec. 1.

European Housing Experts Touring Eastern Cities

Three experts on housing problems in Europe—Miss A. G. Samuel and Sir Raymond Unwin of England and Ernest Kahn of Germany—are touring the large eastern cities in this country under the auspices of the National Association of Housing Officials. During the trip conferences are scheduled with city officials and civic leaders for the discussion of questions and the review of problems in the development of a public housing program. During these conferences the visiting authorities are to lecture on various phases of administrative, operative and legal problems as experienced in Europe. The tour includes thirteen principal cities.

In a radio address in which he welcomed the visitors to the United States, Public Works Administrator Ickes referred to the slum clearance and low cost housing program in this country by calling attention to the fact that "construction has actually begun in New York, Philadelphia, Cleveland and St. Louis." Mr. Ickes, at the same time, voiced dissatisfaction with the scope of the program, and urged a much broader one. The $147,000,000 fund so far made available for limited-dividend projects and the Public Works Emergency Housing Corp. program, while relatively small, will furnish, in Mr. Ickes opinion, a number of housing clinics "that will serve to stimulate public interest to such a point that states and municipalities will take up the work and carry it on as a major social activity."

Washington Notes

By Paul Wooton
Washington Correspondent

A report by Donald Richberg as executive secretary of Executive Council quotes Secretary Ickes as recommending that the PWA and its power to make loans be continued for period of at least two years after June 16, 1935; also that various changes be made in the act, to improve its effectiveness, to make uniform the borrowing power of municipal units and to overcome obstacles to construction of non-federal projects. Questioned concerning the Richberg report, Secretary Ickes said it was news to him, although a report had been submitted to Executive Council recommending that provision be made for carrying on projects for which allotments have already been made that will be under construction for two or three years after the expiration of the present law.

Permanent public works program

Secretary Ickes declared that Federal public works should become a permanent function of government but that the government should not, in his opinion, contemplate financing state and municipal improvements indefinitely. He visualized two federal programs of public works, one a regular continuing program in which the federal government has an interest from the standpoint of the nation as a whole and the other a reserve program to be initiated in times of depression, which would be more local in character. The regular program, he remarked, may be undertaken in cooperation with states and municipalities in certain instances such as stream purification. To such a cooperative basis the same financing policy of combined loans and grants may apply as at present.

Large scale housing in New York

The proposal of Dwight L. Hoopingarner of the Public Works Emergency Housing Corp., for a procedure to be followed in the New York housing program has received Secretary Ickes' approval. Mr. Ickes remarked that in asking that the federal funds be turned over, New York has taken a position contrary to that of other cities in which the federal government is working on low cost housing. If this policy were followed in New York, he said, other communities might feel discriminated against.

PWA financing

An allotment of $20,000 has been made to the Corps of Engineers for detail surveys on the James and Cheyenne Rivers in North Dakota, to determine the economic and technical feasibility of shallow reservoirs for impounding flood waters. A $1,500,000 allotment was made to the District of Columbia for construction of an adult tuberculosis sanitarium on a site adjacent to the children's sanitarium at Glen Dale, Md. This location was opposed by Secretary Ickes but approved by a committee appointed by President Roosevelt to settle the controversy. The purchase by private buyers of a second block of Delaware River Joint Commission bonds at a premium which reduces the interest cost from 4 to 3.91 per cent released $1,150,000 for reallotment by PWA to other projects. The purchase by the Joint Commission of $69,000 of these bonds from sinking fund money also releases a like amount from the original allotment of $11,900,000.

EXCAVATING FOR THE POWER HOUSE AT JOE WHEELER DAM

Great care is being exercised in excavating for the foundations of Joe Wheeler Dam in order not to shatter the rock that is to be left in place or to open up the horizontal bedding seams. Many small shots were used for the blast here shown, as is indicated by the number of drill holes in the exposed rock beyond the blast. Channelling was resorted to in excavating the area at the lower left center where the turbine draft tubes for the power plant are to be built.

The Tennessee River is over a mile wide at the site of Joe Wheeler Dam. On the far shore is the lock recently completed.

The first concrete was placed in the dam last week. Ultimately the structure will require 700,000 cu.yd. A description of the work now in progress was published in our issue of Apr. 26, 1933, p. 525.

Contract for Parker Dam Awarded to Six Companies, Inc.

Contract for the construction of the Parker dam on the Colorado river, which will be the diversion structure for the Colorado River Aqueduct, has been awarded to Six Companies, Inc. on their low bid of $4,239,834. The work consists of building the dam and appurtenant works but does not include the power plant which will be covered by a subsequent contract.

The organization making up the Six Companies, Inc. includes the original group of six contractors (Utah Construction Co., McDonald & Kahn Co. Ltd., W. A. Bechtel Co., J. F. Shea Co., Inc., Henry J. Kaiser Co., and Morrison-Knudsen Co.) now building Boulder Dam, with the addition of the General Construction Co., Seattle, Wash., and Warren Brothers Co., Boston.

Dam to be 340 ft. high

The Parker dam will be of concrete arch type with a maximum height of 340 ft. above foundation. Excavation for foundation involves more than 2,000,000 cu.yd. of material and extends to a depth of 240 ft. below river bed. The dam will have a crest length of 800 ft. and include five spillway openings controlled by 50x50 ft. gates. The dam will raise the level of the river about 80 ft. and form a reservoir 50 miles long with a capacity of 717,000 acre-feet.

The diversion program consists of driving two 29-ft. diameter horseshoe-shaped tunnels each about 1,700 ft. long through the abutment on the Arizona side, to handle the river flow which will be regulated by Boulder Dam, followed by the construction of earth fill cofferdams across the river channel above and below the dam site.

Under contract with the Metropolitan Water District of Southern California, dated Feb. 10, 1933, the Bureau of Reclamation will construct and operate the dam and reservoir and have rights to one-half of the power development. The district will pump from this reservoir into the aqueduct now under construction from the river to the Southern California metropolitan area. The PWA has allotted $2,000,000 for the initial construction operations on this project, which is estimated to cost $13,000,000.

Baltimore Urged to Review Program of Sewage Disposal

A letter from Abel Wolman, chief engineer of the Maryland state health department, sent to Mayor Jackson of Baltimore, has urged that the city make a careful review of its existing sewage disposal facilities with a view to correlating these with the program for future development. It was suggested that the work be done by the municipal bureau of sewers under the supervision of a private consulting engineering service. The recommendation followed conferences between Mr. Wolman and city officials.

The letter pointed out that it had been almost 30 years since a board of consulting engineers reported on the sewage disposal problems of the city and almost 40 years since the preliminary report on sewer interceptors had been made by the old Sewerage Commission.

Midwest Engineering Progress

PWA projects proceeding slowly—Chicago financing improves—Serious obstacles to Milwaukee filtration overcome—Detroit water department gets only PWA loan in Michigan

(Special Correspondence)

CHICAGO, Aug. 28.—Generally speaking, engineering projects in the Middle West are not going ahead with the speed that was predicted for this construction season. Petty politics plays a part in causing the delay, but fear of militant taxpayer organizations and the efforts of some "big business" men and associations of commerce are more important in holding up deserving works.

In Illinois, of the 223 PWA projects for which allotments have been made, contracts have been approved on 74. Of these 74, 44 are under way and 6 have been completed. Many municipalities have turned from the PWA to their old-time financial houses.

Milwaukee filtration plant troubles

In Milwaukee the filtration project is having a thorny path, due to the activity of die-hard opponents who have taken every opportunity to put obstacles in the way of getting finances adjusted. The latest obstacle was an abortive attempt to require a referendum on the issuance of water-revenue bonds, for which it is planned to ask bids Sept. 5. A contract for a washwater tank has already been completed. About 500 ft. of 2,500 ft. of shore protection, a $216,000 job, had been completed when the contractor's bankers required him to stop work until the referendum was out of the way. Work started again on Aug. 23, but no money has been paid out. Because of a favorable local bond market the original loan-and-grant contract with PWA was changed to grant only. It is hoped to ask for bids soon on substructures. Plans are well advanced for reservoirs and coagulation basins.

Other Milwaukee matters of engineering interest are as follows: Profitable work-relief jobs in larger volume are called for this winter by the governor. Ten miles of footpaths along highways are being built by the county. The drought has dried up many park streams that CCC forces have been beautifying, so that the young men have worked in dry stream beds. A federal permit for a proposed bascule bridge over the mouth of the river has been refused by the War Department on the ground that it would be an obstruction. A high bridge would be acceptable. The water department is selling water outside the city limits in areas where wells have gone dry. Milwaukee tried unsuccessfully to put its surplus cash in safety deposit boxes to eliminate a 2 per cent bank insurance charge. South Milwaukee is buying a site for its sewage disposal plant.

Michigan gets drought aid

Michigan has had 41 counties in the southern portion of the state declared in the secondary drought area, making them eligible for federal largess, lowered freight rates on cattle and feed, and farmers' work projects. Detroit traffic officials are wrangling over better placing and lighting of stop signs to reduce accidents. Street widening in Detroit goes on apace, though state contributions are irregular.

The Detroit water department received the only PWA money out of all the millions applied for in the state. Plans for sewage treatment plants and rapid transit got nowhere, mainly because the collateral offered for the loans was considered unsatisfactory. When the state-owned cement plant at Chelsea was ordered dismantled citizens appealed to the governor and the Administration Board. The legislature in 1931 ordered the plant sold by June 30, 1934. About $40,000 was all that was bid, and the Board concluded to do its own wrecking, estimating a salvage of $70,000.

Chicago has just been able to make a payment to school teachers of $22,500,000 in back salaries and to sell at a premium $10,000,000 of municipal bonds, including $3,000,000 in water certificates. City employees will soon have all back salaries paid up. Financing the $22,000,000 filter plant for the South Side still lags. The Ashland Ave. bridge, which will connect two ends of a widened street, will soon be under way with PWA money; bids are asked for Aug. 30. The Outer Drive bridge over the Chicago River, long held up because funds were diverted, can probably be successfully financed by PWA now that the merger of the 22 park districts in Chicago has been declared legal by the State Supreme Court.

Damage suits based on last year's epidemic of amoebic dysentery continue to be filed against hotels and city officials. One of the hotels involved has employed a sanitary engineer and has installed a filter plant.

The Metropolitan Housing Council continues its campaign of demolition of unfit buildings with consent of the owner by work-relief labor. Since June 1, 40 houses have been demolished.

Defective Sewer Tunnel Lining in Chicago Requires Replacing

The concrete lining in a 100-ft. section of the 6x8-ft. Harvey sewer of the Sanitary District of Chicago has been found defective and ordered repaired before acceptance. This is a PWA project with the contract held by S. A. Healy Construction Co. There are no charges of deficiency in thickness, for more than 400 test holes through the concrete shell indicates concrete 20 per cent in excess of that required for the section. Reports indicate that inexperience of the workman resulting in excess over-break, extreme dryness of the mix specified to obtain maximum strength, small section of the tunnel which made difficult the concreting in the crown of the arch and the effect of high temperatures all contributed toward work which both District and PWA inspectors jointly recognized and reported to their respective superiors as not acceptable.

As of Aug. 23 some 3,300 ft. of lining had been placed. Of this section of tunnel Philip Harrington, chief engineer, reports that about 100 ft. of lining was defective with thin spots and honeycombing.

Legislative Committee Studies Highway Industry in New York

A special committee of the New York State Legislature, created by resolution on March 20 and headed by Senator George R. Fearon, has commenced hearings to investigate the entire highway industry of the state. The committee consists of five senators, seven assemblymen, superintendent of public works Frederick Stuart Greene, commissioner of highways A. W. Brandt and three citizens. Cooperating are: the U. S. Bureau of Public Roads, the New York Mayors' Conference and the New York Highway chapter of the Associated General Contractors of America. The resolution calls for a complete study of engineering, construction, design, economics and use of the highways of the state

Traffic counts, valuation of existing roads, listing of highway construction materials, equipment industries and the operations of contractors constitutes some of the data to be reviewed. Stabilization of highway construction, better highway economics and a basis for long-range planning are some of the results expected from the investigation. Aiding Senator Fearon in active work on the committee will be E. C. Lawton deputy commissioner of highways for the state, E. W. James of the U. S. Bureau of public roads, and Harry Hayes of the A.G.C. An engineering report is expected early in 1935.

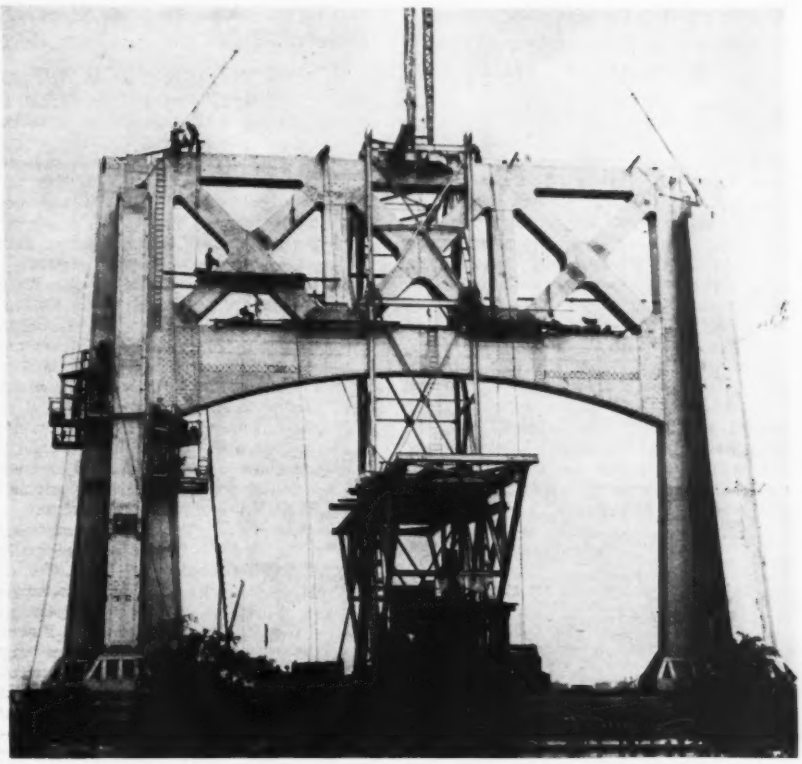
Home Modernization Program Develops Momentum

(Washington Correspondence)

To swell the volume of home modernization, the Federal Housing Administration will authorize lending institutions to make loans for a 5-year instead of a 3-year term up to the maximum of $2,000. There have been indications that the short maturity would discourage the owners of mortgaged property from borrowing for this purpose because of the demand upon immediate income already strained by interest and amortization charges. As 47 per cent of all homes are encumbered, this is too large a part of the modernization field to ignore. Originally applicable only by special permission from FHA, the 5-year maturity is intended to stimulate borrowing for modernization. Undoubtedly, more attractive to building and loan associations, the practical effect of this broader policy may be to concentrate the long-term business in such institutions, leaving the banks to handle small, short-term loans.

A liberal definition of the types of variety of equipment in building, eligible for the Government-insured modernization loans will resolve the doubt of many manufacturers whether they can get a share of the business. Many types of equipment ordinarily regarded as "movables" are eligible if "built in" as, for example, fans, incinerators, kitchen units including ranges and refrigerators, air-conditioners, laundry and coal chutes.

Eligible improvements to grounds upon which buildings stand, include grading and landscaping, sidewalks, curbs and driveways of permanent materials, underground lawn sprinkler systems, new and old silos, barns, sheds, and other buildings, garages, and the demolition of old buildings.



TRIBOROUGH BRIDGE TOWER ERECTED TO ROADWAY LEVEL

With political, legal and financial vicissitudes out of the way, tower erection for the 1,380-ft. suspension span of the Triborough Bridge at New York is making rapid progress. The view shows the Queens tower erected to roadway level (El. +132). This represents about 90 ft. of the ultimate 270-ft. height of the tower above its pier base at El. +40. Erection is being carried out by a guy derrick resting on a special steel staging, separate from the tower, which will be progressively raised as tower erection continues. The work on this tower is being duplicated across Hell Gate on the Ward's Island tower, which is at about the same stage of completion.

Each tower will contain about 5,000 tons of steel above the roadway. The tower legs, 98 ft. apart center to center, will be braced at the portal elevation and at the top by parallel-chord struts similar to the one shown but with five X-braced panels instead of three. Contract for the towers is held by the Taylor-Fichter Steel Construction Co., New York, and fabrication has been sublet to Alco Products, Inc., Dunkirk, N. Y., a subsidiary of the American Locomotive Co. The towers will be completed this fall.

Meanwhile, design work is continuing on the remainder of the bridge project under the direction of O. H. Ammann, Allston Dana and other Port Authority engineers, to whom the design has been delegated by the Triborough Bridge Authority, recipient of the $7,200,000 grant and the $37,000,000 loan from the PWA. Approach work is also active. Land is being acquired in the Bronx. In Queens, construction is under way, and bids for the next large contract—3,700,000 cu.yd. of hydraulic fill for 1¼ miles of the Grand Central Parkway along Flushing Bay—will be opened Sept. 13. In Manhattan a new approach is being designed to run as a 100-ft. boulevard along the East River from 92d to 122d Sts., near the bridge head; on Aug. 27 the city Board of Estimate authorized condemnation of the necessary land. This approach road will cost $6.000,000.

FHA issued this week a manual prepared for the use of architects, contractors, building supply and other merchants, pointing out that in many cases it may be to their advantage to arrange credit for property owners. As of Aug. 25, 3,956 financial institutions had accepted the FHA insurance contract covering modernization loans, and Walter S. Schmidt, president elect of the National Association of Real Estate Boards, pledged the cooperation of realtors in promoting community campaigns.

With respect to home mortgage financing (Title II of the National Housing Act), Federal Housing Administrator Moffett has stated a belief that November 1 would see a start made. There are said to be prospects that a deputy administrator will be named to head the home mortgage division within the next 10 days.

Repayments Start from First Completed Homestead

Families occupying the first 50 subsistence homesteads in the Reedsville community in West Virginia have made repayments to the Federal Subsistence Homesteads Corporation totalling $1,178. These payments constitute the first return to the $25,000,000 revolving fund which was established by Congress to provide for the construction of these projects. The Reedsville experimental community was the first of the projects to be completed and occupied. Monthly payments from the homesteads on this project, which include a house and a few acres of land, range from $18.31 to $22.70 per month and will continue for a 20-yr. period.

Court Continues Injunction Against Code Violation

ON AUG. 18, Judge Sibley in Federal District Court at Atlanta, Ga., continued the injunction obtained on Aug. 8 by the National Recovery Administration against John E. Whitley, president of the Whitley Construction Co., of La Grange, Ga., restraining him from continuing to violate the construction code on a public road contract by paying wages less than 40c. an hour (*ENR*, Aug. 16, 1934, p. 220).

The court declared that it has jurisdiction in the case, but did not rule on the constitutionality of the Recovery Act as a whole; this being now before the U. S. Supreme Court. It stated, however, that the wage provisions as applied to the persons and circumstances directly involved are entitled to be upheld:

> It is a case of contractors who execute work on public roads, which are public roads of the state and also post roads of the United States and also arteries of interstate traffic. The particular contract that is here involved is for some finishing stages . . . and these very contracts contain references, both in the proposal and the contracts, to the aid of the United States and to the United States legislation on the subject, and the bond goes so far as to recite that the United States could sue in its own behalf as well as the state of Georgia for the use of the United States concerning this work. It all goes to show that the work we are dealing with is a work in which both the United States and the state are cooperating and have an interest.

Disclaiming any intent to decide how far the authority of Congress to regulate construction in general extends, the court held that the code has proper application to the contract in question:

> The code undertakes to regulate this work by prescribing maximum hours of labor and minimum rates of pay. The code has nothing beyond the Act in that idea. . . . The case must be viewed as though Congress had passed this code with reference to work of the class with which we are dealing, and the constitutional question is, could Congress regulate the hours of labor and the rates of pay on work in which it had an interest as a post road or as an artery of interstate commerce. . . . My best judgment is that Congress could regulate these matters. . . . When the state of Georgia gets mixed up in it the matter becomes more doubtful, but . . . I am going to refuse to overturn the Construction Code as applied to those post roads and the agreement made to improve and better them, as appears in this case. The result of that is that this code applies to Mr. Whitley and to all other contractors on roads of this character, even though the particular contract that they made is one in which the state furnishes all the money.

The court then took up the question of whether the contract provided for lawfully established hours of labor or rates of pay differing from those of the code, which was relied on as a defense, but after considering the evidence it found that no such conditions were attached to the proposal or formed a part of the contract:

> A written proposal for bids was first sent out by the Board. It said nothing about any departures from the Code, which otherwise would control, and written proposals were made by Mr. Whitley, and according to the general specifications if there were to be any special conditions he had to attach them to the proposal. . . . The contractor that put on his proposal a condition like the one that is here involved would be bidding on anywhere from 8½c. to 30c. an hour, according to the testimony, which might make a great difference in his bid and would not be just competition at all. . . .
>
> I do not think this condition was attached to either proposal when it was made. . . . While the testimony is in some conflict, in the light of what we see here I conclude as a matter of fact the proposals were not made with this condition a part of them. . . . According to the State Highway Commission these conditions came up some days later and he at first objected to their being put into the contract. I do not think that they had any right to go in there. If they had been against Mr. Whitley I do not think he could have been made to perform them and they certainly have not got much substance to them when you look at the actual situation: The condition states that it had been made so the state could get cheap bids and save tax money, and yet it has nothing to do with any bids. It got into the contract after the bids had all been made and after these two had been executed. . . . I do not then think it is any part of the contract and consequently it cannot be any defense. You have to go ahead and perform these contracts under the Code.

The Court continued the injunction until the final disposition of the case.

Lockport Seeks to Use Water Diverted from the Niagara River

The city of Lockport, N. Y., has filed with the Federal Power Commission an application for a license for a municipal hydroelectric power plant and for authority to use 275 sec.-ft. of water diverted from the Niagara River above the falls and conveyed to the city through the New York State Barge Canal. The water applied for is now used by the Niagara Falls Power Co. under a temporary permit. It is the only water remaining of the 20,000 sec.-ft. which is permitted to be diverted from the river on the American side under the treaty between the United States and Canada. A flow of 19,725 sec.-ft. is used by the Niagara Falls Power Co. under license from the power commission.

The city of Lockport is expected to file an application with the Public Works Administration for a loan of $900,000 to cover the cost of constructing a power plant and for $750,000 for a distribution system.

The flow of 275 sec.-ft. in question is part of the flow of 500 sec.-ft. originally assigned to the Hydraulic Race Co. of Lockport, 225 sec.-ft. of which was transferred to the Niagara Falls Power Co. in 1925. In 1928 the Niagara Falls Power Co. applied for a license for this remaining 275 sec.-ft., having received an assignment of rights to the water from the Hydraulic Race Co. In order to permit the water to be usefully employed during the negotiations for the proposed license, the power company has been using the water under a temporary permit. That permit has expired, leaving the way clear for the city of Lockport to apply for a permit to use the water, a privilege sought for some time.

Under the treaty, 20,000 sec.-ft. may be diverted on the American side of the river and 36,000 sec.-ft. on the Canadian side for power purposes. Recently the Hydro Electric Power Commission of Ontario adopted a resolution calling for the initiation of negotiations between the Canadian and United States governments looking towards an increase in the diversion of water for power purposes from above Niagara Falls and authorizing its chief hydraulic engineer, T. H. Hogg, to develop plans for the utilization of water on the Canadian side to the greatest extent possible without detriment to the scenic beauty of the falls.

Low Cost Housing Project Resumed in St. Louis

Payment of $85,000 by the PWA Housing Division to the Neighborhood Gardens limited-dividend housing project of St. Louis, Mo., was authorized last week, thus permitting construction work to be resumed after work had been suspended over a question of title to alley land vacated by the city. Title to the area now has been guaranteed resulting in the first release of government money on the $640,000 loan.

Neighborhood Gardens is one of the seven limited-dividend housing projects being carried out under supervision of the PWA Housing Division of PWA, as part of the $147,000,000 low-cost PWA housing program.

The Neighborhood Gardens development, which will cost $742,000 to complete, is being erected in a bad slum area of St. Louis, near the Mississippi River. The project will provide 252 apartments of two, three and four rooms.

PWA Announces Allotments For Non-Federal Projects

The PWA allotments for non-federal construction projects continue at a slower rate with funds made available by the rescinding of previous allocations, the reduction in previous loans and the changing of loans and grants to straight grants.

During the past week Administrator Ickes announced allotments to 58 non-federal projects totalling $6,962,370. This financing consisted of loans and grants to 47 of the projects, and the other 11 were awarded grants only of 30 per cent at their own request. The projects were located in 25 states.

As announced in last week's issue, the allotments in the preceding week totalled $24,540,250 to 215 non-federal projects. The details of these 215 allotments are given in the following tabulation:

KEY TO SYMBOLS

*-grant only	
m-meters	c-canal
p-pump	dm-dam
t-tank or standpipe	r-reservoir
f-filtration	t-treatment plant
d-distr. supt.	b-building
w-well	i-iron removal
s-supply	pw-power line
g-generator	sf-softening
ch-chlorinators	bl-boilers

Waterworks

Abernathy, Tex., w-r-t-d	$26,000
Adams, Wis., w-p-r-t-d	110,000
Ashland, Ill.	75,000
Ashland, Kan., w-d	32,000
Bowie, Tex., dm-tr-s-d	164,000
Broken Bow, Neb., r-w-p-d	34,000
Buffalo Gap, S. D., w-r-p-d	27,000
*Butterfield, Minn., w-p-t-d	9,000
Camden, Ohio, w-p-t-d	50,000
Canfield, Ohio, w-t-d	70,000
*Checotah, Okla., dm-s	23,000
Coshocton, Ohio, 4w-pg-d	164,000
Decatur, Ark., s-t-d	30,000
East Canton, Ohio, w-p-d	57,000
Eddyville, Ky., s-f-r-p-d	40,000
Escanaba, Mich., f repairs	7,000
Fruita, Colo., d	40,000
Gnadenhutten, Ohio, w-p-t-d	49,000
Grand Rapids, Mich., s (also sewage pumping)	34,000
*Green Isle, Minn., w-p-t-d	6,000
Griggsville, Ill., w-p-t-d	90,000
Grove Hill, Ala., w-t-d	28,000
Hamilton, Ala., w-t-d	35,000
Havana, Ill., d	21,000
Hot Springs, Mont., s-t-d	36,500
LaCenter, Ky., w-t-ch-d	35,000
Levan, Utah, d	35,000
Monroe, Ohio, w-p-t-d	25,000
New York, N. Y., d	510,000
New York, N. Y. (tunnel)	1,013,000
Odem, Tex., w-p-r-t-d	31,000
Onaga, Kan., dm-tr-d	24,000

Pemberville, Ohio	75,000
Perrysville, Ohio, w-p-r-d	23,000
Redmond, Ore., d	46,000
Richwood, Ohio, w-p-t-tr-d	80,000
Sebree, Ky., w-t-d	53,000
Standish, Mich., f-s-ch-t-d	53,000
Stoneville, N. C., w-p-t-ch-d	44,000
Trenton, Mich., f	12,000
Tyronza, Ark., w-p-r-t-d	26,000
Villa Grove, Ill.	45,000
Warrensburg, Ill., w-t-d	36,000
Waynesfield, Ohio, w-p-t-d	35,000
Winchester, Ohio, w-p-t-d	47,000
Zwolle, La., w-p-t-r-d	12,000

Sewers

Bexar County, Tex. (San Antonio), p (also administration building)	154,000
*Cambridge, Ohio	10,000
Shullsburg, Wis.	14,000

Sewage Disposal Plants

Grants Pass, Ore.	45,000
Medford, Ore.	100,000
Oxnard, Calif.	72,000
Polo, Ill.	36,000
Salem, Ill.	46,000

Sewers and Disposal Plants

Alden, N. Y.	91,000
Batesville, Ark.	43,000
Brinkley, Ark.	41,000
Callaway, Neb.	25,000
Carbon Hill, Ala.	81,000
Carlisle, Ark.	33,000
Clinton, Okla.	41,000
Gladstone, Mich.	90,000
Huntington Beach, Calif.	100,000
Kaysville, Davis County, Utah	55,000
Las Vegas, N. M.	25,000
Moore, Okla.	21,000
New York, N. Y.	1,868,000
*Roanoke, Ill.	19,000
Rochester, Mich.	67,000
Stuart, Neb.	59,000
*Troy, Ndaho	5,000

Storm Sewers

Escanaba, Mich.	45,000
Kingston, Pa.	*35,000

Street or Road Construction

Cincinnati, Ohio	*10,800
Davis County, Utah	53,300
Donaldsonville, La. (also sidewalks)	148,000
*East Alton, Ill.	20,200
Eaton Rapids, Mich.	9,500
Elma, Iowa	10,000
Ely, Nev. (also storm and sanitary sewers)	45,000
Escanaba, Mich.	15,500
Escanaba, Mich.	66,700
Fort Worth, Tex.	150,000
Grand Forks, N. Dak.	83,000
Grayville, Ill.	10,800
Idabel, Okla.	*8300
*Lower Merion Township (Montgomery Co.), Pa.	135,000
*Medford, Mass. (also sidewalks)	107,500
Ossining, N. Y.	18,000
Shoshone, Idaho	20,000

Bridges

*Boston, Mass.	103,000

Buildings

Albuquerque, N. M. (armory)	4,700
*Bennettsville, S. C. (library)	800
Bozeman, Mont. (court house)	300,000
Broadwater Co., Townsend, Mont. (court house and jail)	55,600
*Clovis, N. M. (armory)	2,600
*East Prospect, Pa. (community hall)	2,500
Faulkner County, Ark. (jail)	100,000
Fort Worth, Tex. (library)	650,000
Frankfort, Ky. (dormitory)	125,000
*Hettinger Co. (New England, N. D. (community building)	8,600
*Home and Training School for Mental Defectives, Los Lunas, N. M. (Superintendent's residence)	2,100
*Home and Training School for Mental Defectives, Los Lunas, N. M.	8,900
Kootenai Co., Idaho (co. home and hosp.)	52,000
Lake County, Mont. (court house)	39,700
*Las Cruces, N. N. M. (armory)	1,200
Las Vegas, N. M. (fire dept. bldg. and city hall alterations)	45,000
*Las Vegas Armory Bd. of Control, San Miguel Co. (armory)	1,500
Latah Co., Moscow, Idaho (co. home and hosp.)	52,000
Lewiston City, Utah (civic bldg.)	35,750
Miami, Fla. (hospital)	320,000
Missoula, Mont. (jail bldg.)	81,000
*New Mexico Asylum for Deaf and Dumb, Santa Fe, N. M.	29,700
New York, N. Y. (hospital)	185,000
New York, N. Y. (hospital improvs.)	535,000
New York, N. Y. (laboratory bldg.)	700,000
*Refugio, Tex. (city hall and recreation center)	12,000
St. Clair County, Ill. (jail)	230,000
*St. Louis, Mo. (memorial)	832,000
San Mateo County, Calif. (office bldg.)	146,000
San Miguel Co., Las Vegas, N. M. (court house and jail improvs.)	45,000
*Santa Fe, N. Mex. (armory add.)	4,300
Snow Hill, N. C. (court house)	100,000
State of New Mexico, Santa Fe, N. M. (court bldg.)	229,000
Stryker, Ohio (village hall)	5,500
Topeka, Kan. (fire station)	24,000
Wauwatosa, Wis. (city hall)	100,000
Wauwatosa, Wis. (garage and shop)	25,000
*Wauwatosa, Wis. (institutional repairs and incinerator and laundry)	132,000
Wayne, Neb. (Municipal bldg.)	44,000
Winside, Neb. (community bldg.)	8,900

Schools

Ansley, Neb.	42,400
Ariz. State Teachers' Coll., Flagstaff, Ariz.	360,000
Arlington, Ariz. (Maricopa Co.)	43,000
Bannock Co., Idaho	35,500
Board of Education, State of Mont., Miles City, Mont.	80,000
Bonneville Co., Idaho	10,000
Breathitt County, Ky.	15,200
Butler County, Ala.	78,200
Butler County, Neb.	56,000
Cache Co., Logan, Utah	213,000
Capitan, N. M. (Lincoln Co.)	54,600
Carlsbad, N. M.	59,200
Carter County (Fox), Okla.	27,900
Central School Dist. No. 1, Broome and Chenango Cos., Harpursville, N. Y.	173,000
Clark County, Nev. (Overton, Bunkerville, Mesquite)	56,000
Clifton Hill, Mo. (Randolph Co.)	10,520
Columbia Falls, Mont.	50,000
*Cook County, Ill.	170,000
Cove (Union Co.), Ore.	22,000
Cullman County, Ala.	79,700
*Davis County, Utah	14,300
Daykin, Neb.	16,600
Douglas County (Villa Grove), Ill.	38,700
Drain, Ore.	51,500
Eastchester, N. Y.	371,000
Eastern N. M. State Normal School, Portales, N. M.	49,000
Flagstaff, Ariz. (Coconino Co.)	70,000
Flathead County, Mont.	210,000
Garden City, N. Y.	930,000
*Greenwood, Del.	20,900
Hempstead, N. Y.	650,000
Keller Co., Colo.	10,000
Lakeview (Lake Co.), Ore.	50,000
Lauderdale County (Killen), Ala.	30,000
Lawrence County (Town Creek), Ala.	10,000
*Leavenworth, Kan.	8,500
Liberty Co., Mont. (Chester)	48,500
Logan County, Ill.	11,500
Lima, Idaho	19,000
*Maricopa County, Ariz.	4,500
Maricopa Co., Ariz.	14,700
Mason City, Neb.	45,900
*Merrimac, Mass.	28,600
Mineral County, Nev.	55,000
Missoula, Mont.	192,000
Newberg, Ore.	50,000
New Mexico Military Inst., Roswell, N. M.	200,000
N. M. Normal School, Silver City, N. M.	102,400
N. M. School of Mines, Socorro, N. M.	93,000
Northern Mont. Agr. & Manual Training School, Havre, Mont.	166,000
Noxon, Mont. (Sanders Co.)	18,800
Oceanside, N. Y.	451,600
Ogden City, Utah	884,700
Oglesby, Ill.	22,000
Orofino, Clearwater Co., Idaho	52,000
Orofino, Clearwater Co., Idaho	52,000
Platte City, Mo.	12,000
Rison, Ark.	47,000
School Dist. No. 38, Maricopa Co., Phoenix, Ariz.	27,700
School Dist. No. 79, Maricopa Co., Litchfield Park, Ariz.	9,500
Shelby County, Ill.	78,000
*State of Iowa (State Univ.)	35,500
Sweet Home, Ore.	50,000
Talmage, Otoe County, Neb.	35,400
Tiptonville, Tenn.	21,000
*Ucon, Idaho (Bonneville Co.)	3,400
Union Free School Dist., Monroe Co., Churchville, N. Y.	185,000
*University of Ala., Tuscaloosa Co., Ala. (gymnasium)	34,000
University of Ariz., Tucson	815,000
University of New Mexico, Albuquerque	250,000
Wadsworth, Nev. (Washoe Co.)	23,000
Yellowstone Co., Mont. (Laurel)	62,000

Miscellaneous

Big Springs, Tex. (swimming pool and bathhouse)	32,000
Cave-in-Rock, Ill. (Electric plant, diesel)	23,000
Decatur, Ala. (electrical distribution and substation)	350,000
Donaldsonville, La. (alarm system)	3,000
Donaldsonville, La. (incinerator)	10,000
Fulton, Mo. (gas generating plant d)	98,500
Fulton County, Ga. (ditches)	105,000
Memphis, Tenn. (abattoir)	150,000
*Mesa, Ariz. (gas transmission line)	14,500
Morenci, Mich. (light and power plant)	146,000
New York, N. Y. (pier)	774,400
New York, N. Y. (pier improvs.)	207,000
New York, N. Y. (pier improvs.)	1,282,000

Col. Sultan Appointed Engineer-Commissioner of Washington

Col. Daniel I. Sultan, Corps of Engineers, has been appointed engineer-commissioner for the District of Columbia. Colonel Sultan succeeds Maj. John C. Gotwals who is to retire from Army service September 30.

The engineering service of Colonel Sultan has included a term as district engineer, Savannah, Ga., lock and dam construction work on the Ohio River, membership on the board of engineers for rivers and harbors in the office of the Chief of Engineers, instructor in engineering at West Point and at the Engineering School.

Colonel Sultan was in charge of the Nicaragua Canal survey from 1929 to 1931 and upon his return from this duty was assigned to the Inter-Oceanic Canal Board in the office of the Chief of Engineers, serving from July, 1931 to January, 1932. Later in 1932 he was assigned as district engineer in Chicago and subsequently became administrator of the CWA work in Cook County.

SOCIETY CALENDAR

INTERNATIONAL CITY MANAGERS ASSOCIATION, annual conference, St. Louis, Oct. 15-17.

AMERICAN SOCIETY OF MUNICIPAL ENGINEERS, Annual Meeting, Rochester, N. Y., September 24-28.

INTERNATIONAL ASSOCIATION OF PUBLIC WORKS OFFICIALS, Annual Meeting, Rochester, N. Y., September 24-28.

NATIONAL SAFETY COUNCIL, Annual Meeting, Cleveland, Ohio, Oct. 1-5.

AMERICAN WELDING SOCIETY, fourteenth fall meeting, New York City, Oct. 1-5.

AMERICAN ROAD BUILDERS, annual convention, Washington, D. C., Jan. 8-11.

NEW YORK SECTION, AMERICAN WATER WORKS ASSOCIATION, fall meeting, Buffalo, Oct. 11-12.

WISCONSIN SECTION, AMERICAN WATER WORKS ASSOCIATION, Annual Meeting, Wausau, Sept. 24-26.

ROCKY MOUNTAIN SECTION, AMERICAN WATER WORKS ASSOCIATION meets in Santa Fe, N. Mex., Sept. 10-12.

AMERICAN ASSOCIATION OF PORT AUTHORITIES, 23rd annual convention, New York City, Sept. 10-13.

NEW ENGLAND WATER WORKS ASSOCIATION, annual fall convention, Boston, Mass., Sept. 18-21.

Personals

J. RAY MONAGHAN of Indianapolis has been appointed assistant state PWA engineer inspector of Indiana.

WALTER STAHL has retired from the partnership of Stahl & Sprol, a contracting organization of Baltimore. Samuel J. Sprol will continue the contracting organization under his own name.

KENNETH MARKWELL, engineer of the Memphis Harbor Commission, has been named PWA engineer at Nashville, Tenn. to succeed Thomas H. Allen, resigned. Mr. Allen resigned from the PWA office to become a member of the Memphis water board.

PORTER H. ADAMS has been elected president of Norwich University, Vermont. President Adams is a graduate of M.I.T. and has been particularly active in the field of aeronautical engineering. He has been

serving as acting president of the university since last December.

HERMAN MEINERS, formerly an engineer employed by the sewerage commission of Louisville, Ky., has been appointed sewer engineer for the department of works in that city. Mr. Meiners succeeds P. M. Brooks who has been in the department for 20 years. Mr. Brooks will become a special employee of the department. EMMETT KIRWAN has been promoted to the position of chief draftsman in the department.

S. C. HOLLISTER, former professor of structural engineering at Purdue University, has been appointed director of the School of Civil Engineering at Cornell University. Educated at Washington State College and the University of Wisconsin, Professor Hollister had several years of practical engineering experience in Oregon before becoming an instructor in mechanics at the University of Illinois, where he remained until 1917. During the War he was with the Emergency Fleet Corporation and subsequently engaged in private consulting practice in Philadelphia until 1930, when he went to Purdue University. He was president of the American Concrete Institute from 1932 to 1934.

THOMAS R. BEEMAN, engineer of King County from 1920 to 1927, has been appointed city engineer of Seattle. Mr. Beeman succeeds M. O. Sylliaasen who resigned from office with the recent change in administration. During the interim Oscar A. Piper, assistant city engineer, has been acting city engineer. Mr. Beeman is a graduate of the Texas Agricultural and Mechanical College, 1903, and was engaged in railroad location and construction in the western states for several years. He became construction engineer of King County, Wash., in 1914, and following overseas service during the War as a captain of engineers, he was with the Washington state highway department prior to becoming county engineer in 1920. Recently he has been serving as chief engineer for the King county regional planning commission.

Obituary

JOSEPH FRANCIS, civil engineer of Rensen, N. Y., died Aug. 21 at the age of 29. Mr. Francis was a graduate of Rensselaer Polytechnic Institute, 1928.

GEORGE E. STUART, former street commissioner of Newton, Mass. and a past president of the Massachusetts Highway Association, died Aug. 20. Mr. Stuart had retired Aug. 1 after 55 years of service in official offices in Newton. He had been street commissioner for seven terms.

THOMAS R. KENNEDY, retired consulting engineer, died at his home in Cheswick, Pa., Aug. 22 at the age of 72. Mr. Kennedy was in the service of the Pennsylvania railroad for a period of ten years in the construction and maintenance department and had served as consulting engineer on railroad, mining and municipal projects in the Middle Atlantic States.

CONSTRUCTION STATISTICS OF THE WEEK

ENGINEERING construction shook off a four weeks' lethargy with a figure of $36,671,000 for this week, the third high week for the year. This increase is due to federal awards, $15,270,000, and private awards, $9,887,000, while state and municipal awards at $11,514,000 are higher than last week but below the average week to date in this classification.

Major increases are in earthwork, irrigation, drainage and waterways, $12,722,000, industrial buildings, $7,247,000, and highways at $6,434,000. Public buildings at $4,252,000, commercial buildings at $1,960,000, bridges at $2,581,000 also recorded gains while waterworks and sewerage awards were lower than last week.

The larger awards include: Dearborn, Mich., steel mill and equipment for Ford Motor Co., $5,900,000; bank and office building for Federal Reserve Bank, New York City, $800,000; extension, building 163, Navy Yard, Norfolk, Va., $610,000; highway awards by Illinois, $748,000, by Missouri, $1,150,000, by Wyoming, $636,000, by Pennsylvania, $605,000; superstructure, railroad bridge over Cape Cod Canal at Buzzards Bay, Mass., $981,000; Parker Dam, on the Colorado River, $4,240,000; dikes and revetments, Missouri River in Missouri, $1,518,000 and $1,171,000; in Nebraska, $1,986,000, $1,140,000 and $739,000; and dredging, Brownville, Tex., $1,486,000.

New capital for the week includes $3,310,000 in state and municipal bond sales and net gains in PWA allotments of $3,120,000.

CONTRACTS
(Thousands of Dollars)

	Weekly Average Week Aug. 1933	Prev. 4 Weeks	Aug. 30 1934
Federal Government	$600	$4,160	$15,270
State and municipal	7,300	11,372	11,514
Total public	$7,900	$15,532	$26,784
Total private	6,913	2,579	9,887
Week's total	$14,813	$18,111	$36,671
Cumulative to date: 1933	$570,061	1934	$858,089

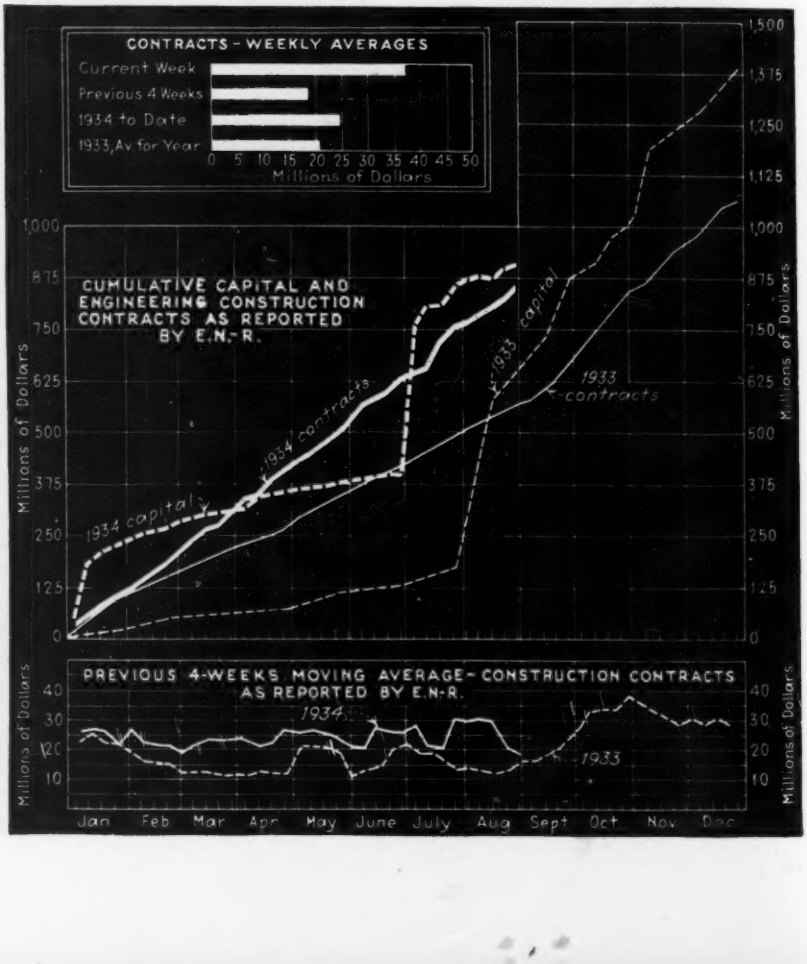
NEW PRODUCTIVE CAPITAL
(Thousands of Dollars)

1934	Week Aug. 30	Cumulative
State and municipal	$3,310	$228,058
PWA allotments, S&M	3,120	599,553
RFC loans, S&M	....	9,463
Corporate issues	18	18,081
PWA allotments, private	....	54,272
Total, Non-Federal	$6,448	$909,427
PWA allotments Federal Constr.	90	181,047
Total new capital	$6,538	$1,090,474
Cumulative to date: 1933	$658,106	1934	$909,427

NOTE: These figures include private bonds, and stocks sold for productive purposes; state and municipal bonds for construction; PWA loans and grants to states and municipalities, including the special highway funds; PWA private loans, and allotments for Federal construction.

INDEX NUMBER

E.N.-R.- Cost	1913 = 100	1926 = 100	E.N.-R.- Volume	1913 = 100	1926 = 100
Aug., 1934	198.40	95.37	July, 1934	128	56
July, 1934	199.65	95.97	June, 1934	119	50
Aug., 1933	167.00	80.27	July, 1933	65	28.5
1933 (Av.)	170.18	81.80	1933 (Av.)	102	45
1932 (Av.)	156.97	75.45	1932 (Av.)	127	56
1931 (Av.)	181.35	87.17	1931 (Av.)	220	96.5



CONSTRUCTION REPORTS

WATERWORKS

PROPOSED WORK

Colo., Boone—Committee plans 2 mi. pipe line from Ross Springs to here, and install water system in town. B. Allensworth, chn. com.

Fla., Daytona Beach—City voted to authorize issuance $280,000 of certificates for improvements to waterworks system. P.W.A. project. Noted Mar. 8.

Ill., Bushnell—City plans watermains. $17,000 allotted by P.W.A.

Ill., Crotty—Village soon takes bids water reservoir, iron removal plant, 20,000 gal. aerator, pressure filters. $12,000 loan and grant allotted by P.W.A. Wells Eng. Co., Geneva, engrs. Noted Jan. 18.

Ill., Eldorado—City plans waterworks improvements. J., L. Typy, Inc., 6801 Surmack Rd., Berwyn, engrs.

Ill., St. Elmo—City making plans waterworks and distribution system, incl. pump house, reservoir, tank on tower, c.i. mains, fire hydrants. $65,000. Grant and loan allotted by P.W.A. Beard Eng. Co., 44 South Central Ave., Clayton, Mo., engrs. Noted Dec. 28.

Ill., Urbana—State, Springfield, plans improving water supply at University of Illinois. Alvord, Burdick & Howson, 20 North Wacker Dr., Chicago, engrs.

Ky., Louisville—Louisville Water Co. making plans installing automatic screens at water intakes in Ohio River and 60 in. rein.-con. main from pumping station to Crescent Hill Reservoir. $360,000. John Chambers, c/o owner, 435 South 3rd St., engr. Alvord, Burdick & Howson, Civic Opera Bldg., Chicago, Ill., consult. engrs.

Mich., Standish—City, S. E. Graves, clk., plans water system, $53,000 P.W.A. allotment. Bruce Buchanan, Inc., Pontiac Bank Bldg., Pontiac, engrs. Noted Nov. 16.

Mich., Trenton—City, R. B. Clark, city atty., City Hall, plans water filtration plant. $12,000 P.W.A. allotment. L. A. Doan, Trenton, engr. Noted July 20.

N. Y., Leicester—Village plans water supply system. B. E. Brophel, mayor and chn. of committee in charge.

N. Y., Medina—Village defeated $222,000 for Shelby Basin water supply system. Bd. Trustees has 3 other water supply projects to submit to voters, to cost $755,000. Noted July 19.

N. Y., Westfield — Bd. Water Comrs. will engage engineer to make study of water system and plan enlarging facilities. To exceed $12,000.

O., Canfield—Village has received P.W.A. loan and grant of $70,000 for waterworks plant.

O., Groveport—Village approved bond issue constructing waterworks plant. $42,000. Jennings-Lawrence Co., 12 North 3rd St., Columbus, engrs. Noted July 20.

O., Wooster—City, plans installing water softener at municipal waterworks. $52,000. City Engineer, engr.

Tex., Abernathy—City, c/o W. H. Brown, mayor, plans waterworks, incl. well, elevated tank, pipe distribution system, pumps and pumping station. $26,000 P.W.A. allotment approved. H. N. Roberts, Lubbock, engr.

Tex., Bowie—City plans waterworks improvements. $164,000 P.W.A. allotment approved. Municipal Eng. Co., Burt Bldg., Dallas, engrs. Noted Aug. 17.

Tex., Del Rio—City, c/o Secretary, election Sept. 8, $62,000, waterworks improvements. P.W.A. project. Noted Mar. 22.

Tex., Hallettsville—City, c/o W. D. Timm, mayor, plans waterworks improvements. $29,000. P.W.A. loan and grant changed to $4,900 grant only. Terrell Bartlett Engineers, Smith-Young Tower, San Antonio, engrs. Noted June 28.

Tex., Odem—City, c/o E. S. Butler, mayor, plans waterworks. P.W.A. approved $31,000 allotment. D. M. Duller, 1618 2nd Natl. Bank Bldg., Houston, engrs. Noted Feb. 22.

Utah, Lehi—City election Sept. 14, to vote bonds as security for $40,000 P.W.A. loan for replacing 1 mi. wooden pipe with 6x8 in. c.i. pipe, also extending distribution system. $40,000. E. N. Jones, Lehi, engr. Noted July 26.

Utah, Monroe—City plans constructing concrete reservoir. $42,000. P.W.A. loan granted. Caldwell & Richards, Templeton Bldg., Salt Lake City, engrs. Noted Sept. 15.

Utah, Richfield—City plans replacing 12 mi. steel line with cast iron pipe, installing 29 additional hydrants, 775 meters. $116,000. P.W.A. loan granted. E. C. Christensen, Richfield, engr.

Utah, Tremonton—Election Sept. 18, $21,000, for repairing and rebuilding water system. C. O. Roskelly, Brigham City, engr. Noted July 26.

Ont., Windsor—City Engineer preparing plans constructing water storage basin, $50,000.

Que., Bury—Town plans addtions to waterworks, $20,000.

Que., Harve St. Pierre—Municipality plans installing waterworks system, incl. 75 tons of piping, 4,000 bags cement and 15,000 ft. lumber.

BIDS ASKED

Ark., Glenwood—Sept. 5, by Incorporated Town, at office of J. C. Self, mayor, complete waterworks system. W. F. Reagan, Glenwood, engr. Noted July 12.

Colo., Erie—City bids about Sept. 16, constructing water plant, clear water well reservoir, in connection with plant. Shepperd & McCullough, Majestic Bldg., Denver, engrs.

Ill., Ramsey—Sept. 8, by Village, waterworks and distribution system, incl. deep well, pumps, motors, tank on tower, distribution mains, hydrants, valves and boxes. $34,000. W. A. Fuller Co., 2916 Shenandoah Ave., St. Louis, Mo., engrs. P.W.A. project. Noted Aug. 23.

Ind., Hope—Sept. 5, by Town, L. Lambert, clk., waterworks equipment, constructing, installing deep well, pumping units.

Mich., Grayling—Sept. 5, by O. G. Clippert, village pres., Crawford Co. Court House, waterworks system, incl. wells, deep well turbine pumps, pump houses, elevated storage tank, 20,000 ft. 4- to 8-in. pipe, special castings, gate valves and hydrants, service meters, recording meters, etc. $48,245. P.W.A. project. Hayden & Kunze, 705 Lawyers Bldg., Detroit, engrs. Noted Oct. 19.

N. J., Chester—Sept. 7, at office J. C. Hoffman, boro clk., constructing deep well or wells, storage tank and distribution system. P.W.A. project. Knight & Bauer, Inc., 38 East Park St., Newark, consult. engrs.; adv. E.N.-R. Aug. 30. Noted July 26.

New York—Sept 18, by Bd. Water Supply, G. J. Gillespie, pres., 346 Bway., New York, furnishing, testing, delivering electric cables, conductors and appurtenances for gate, valve and drainage chambers, furnishing, delivering, operating and indicating apparatus for section and needle valves in Shaft 9A of City Tunnel, Contr. 255. P.W.A. project; adv. E.N.-R. Aug. 30.

N. Y., Rochester—Sept. 10, by Municipality, elevated water tank. $27,300.

N. Y., Batavia—City, bids about Oct. 1, constructing 1¼ m.g. elevated water storage tank, $96,000. Bonds voted. A. Potter, 50 Church St., New York, engr. Noted July 12.

S. C., Lynchburg—Sept. 11, by City Council, two 10 in. deep wells, 200 ft. each, two turbine type deep well pumps, 2 buildings, 1 hoisting tower and hoist. Former bids rejected. Ryan Eng. Co., Arcade Bldg., Columbia, engrs.

Tex., Richland Springs—J. B. Coffey, mayor, taking bids waterworks system, incl. 16,000 lin. ft. 3- to 8-in. distribution c.i. pipe system, fire hydrants, service connections, 75 ft. steel tank, 150,000 gal. steel tank. $30,000. S. J. Bross, San Saba, engr. Noted July 19.

W. Va., Matewan—Sept. 10, by Town, improving water and sewerage systems. P.W.A. project. F. J. Kyle, Charleston, consult. engr.; adv. E.N.-R. Aug. 30.

Ont., Burlington—Burlington Water Comn., bids about Aug. 24, constructing 2,500 ft. intake into Lake; bids about Oct. 1, buildings and equipment. Total cost $149,500. G. H. Power, town engr. H. G. Acres, Niagara Falls, consult. engr. Noted Aug. 16.

CONTRACTS AWARDED

Ark., Calico Rock—A. G. Perryman, recdr., Contr. (A) furnishing, erecting 50,000 gal. water tank and tower complete, to Chicago Bridge & Iron Wks. Co., Magnolia Bldg., Dallas, Tex., $5,940; Contr. (B) furnishing all materials and constructing all portions of work not covered in Contr. (A), to McEachin & McEachin, Southern Bldg., Little Rock, $35,637. Contracts tentatively awarded pending P.W.A. approval. P.W.A.

Calif., San Francisco—Public Utilities Comn., City Hall, laying University Mound Pipe Line extension in Potrero Ave., Spec. WD-62, to Sibley Grading & Teaming Co., 165 Landers St., $53,503. Bids Aug. 8, awarded Aug. 14.

Calif., San Francisco—Public Utilities Comn., City Hall, laying 6 and 8 in. c.i. mains and fittings in area from 8th to 25th Aves., from Fulton to Lake Sts, and in area from Egbert St. to Sunnyvale Ave. and from Elliott St. to Griffith Ave., Spec. WD 49, Spec. WD 48, for City and San Francisco Co., to Lowrie Paving Co., 1540 16th St., $37,331 and $33,972 respectively. Bids July 27, awarded Aug. 14.

Ind., Hammond—City, waterworks improvements, incl. fill behind bulkhead, to W. Prohl Constr. Co., Hammond, $15,000.

N. Y., Orangeburg—See "Sewerage and Waste Disposal."

N. Y., Pelham—Village, installing watermains, Contr. C, to Kurchar Bros., Inc., Franklin Ave., Montvale, $78,207***water meters, Contr. D, to Thomson Meter Corp., 50 East 42nd St., New York, $5,144***copper tubing, etc., Contr. E, to Dingmam Plumbing & Heating Co., Inc., 15 South 6th Ave., Mount Vernon, $3,632. Bids Aug. 19. (**Correction**—Wrong contracts listed in former report.) Noted Aug. 9.

O., Ashville — Village waterworks system, Items 1 to 17 (inclusive), to E. C. Bartling & Son, 1585 Bryden Rd., Columbus, $38,145*** Items 18, 19 to 26, to Downing & Hetrick, Inc., 12 North 3rd St. Columbus, $12,092***Item 27, to Chicago Bridge & Iron Wks., 37 West Van Buren St., Chicago, Ill., $8,890. Grand total $59,127. P.W.A.

O., Cincinnati—City, A. S. Hibbs, supt. Waterworks, laying water-mains in any part of city where needed as directed, under so called "hobo contract," to Crumley, Jones & Crumley, Temple Bar Bldg., $34,423.

†**O., Fairfield**—Con. Q.M., Fairfield Air Depot, Patterson Field, zeolite, water softener, to W. B. Scaife & Sons Co., Oakmont, Pa., $3,855. Bids Aug. 16.

O., Louisville—Village Council, constructing waterworks system. Contr. A, to J. W. Goetz, 716 Renkert Bldg., Canton, $10,475***Contr. B, to Nickels Bros., 1026 Harris Ave., N.W., Canton, $18,383***Contr. C, to Chicago Bridge & Iron Co., 37 West Van Buren St., Chicago, Ill. P.W.A. Bids July 24. Noted Aug. 2.

Pa., Pittsburgh—J. P. Kerr, controller, altering filtration plant, near Aspinwall, to D. Dinardo, 333 Boquet St., $23,406. Bids Aug. 16. Noted Aug. 16.

Tex., Round Rock—City, W. R. Woolsey, mayor, water system, distribution system, deep well, fire hydrants, etc., to N. A. Saigh Co., Builders Exch. Bldg., San Antonio, $42,349. Est. $50,000.

SEWERAGE AND WASTE DISPOSAL

PROPOSED WORK

Mo., Clayton—St. Louis Sanitary Sewer Dist., election Sept. 25, $5,878,000 for modern sewerage system in district, covering 100 square miles bounded by Lindburgh Blvd., Gravois Creek, Maline Creek, and St. Louis city limits, except that Shrewsbury, all of Maplewood, eastern strip of Richmond Heights and eastern third of Clayton are excluded from District. $1,361,000 P.W.A. grant tentatively offered. W. W. Horner, International Bldg., St. Louis, consult. engr.

Mo., St. Louis—City completed preliminary plans and may take bids early in fall, constructing Southern-Arsenal Joint Relief Sewers, incl. 5 ft. to 8½ ft. sewers with laterals, etc., in district bounded by Mississippi River, Charlton and Sidney Sts., Grand Blvd., Gustine and

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Federal Government projects are classified under heading denoting type of work and designated by symbol of †

◆

†*Federal Government.*

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Sewerage, etc. (Continued)

Ann Arves, $2,490,000. $541,000 grant allotted by P.W.A. L. A. Pettus, city engr.

BIDS ASKED

Ark., Glenwood—Sept. 5, by Incorporated Town, at office of J. C. Self, mayor, complete sanitary sewerage system. W. F. Reagan, Glenwood, engr. Noted Apr. 26.

Calif., Colton—Sept. 11, by City Council, constructing sewage filtration plant. To exceed $40,000. P.W.A. granted $40,000 loan. Currie Eng. Co., Andreson Bldg., San Bernardino, engrs.

†Kan., Fort Riley—Sept. 5, by Con. Q.M., Marshall Field, drainage system at Marshall Field.

Mass., Cohasset—Sept. 5, by Town, N. Hurwitz, chn. Bd. Health, Town Hall, constructing concrete storm drains in James Brook. P.W.A. Project Docket 5045. $37,200. Metcalf & Eddy, 1300 Statler Bldg., Boston, engrs. Noted Dec. 14.

Mo., Marshall—Sept. 11, by City, P. A. Land, clk., constructing 2 sewage disposal plants, outfall sewer lift station, 10,664 lin. ft. 10- to 21-in. vitr. pipe laid, twenty 6 in. wyes, 1,376 ft. c.i. pipe laid, 48 cu.yd. concrete pipe piers and pipe encasement, 1 sewage disposal plant of separate sludge digestion tye, 1 sewage disposal plant of Imhoff tank type and lift station, with two 50 g.p.m. sewage ejector units complete. $135,000. Returned unopened bids received Aug. 21. P.W.A. project.

Mo., Springfield—Sept. 4, by City, constructing part of Jordan Valley Drainage Project Flood Control. Bond Issue Item 21, incl. 4,218 cu.yd. excav.; 1,300 cu.yd. concrete, 195,000 lb. steel, 6,800 lb. castings, 11 manholes, 105 lin.ft. lower sewer, 1,431 ft. 42 and 48 in. rein.-con. pipe, 4,241 lin.ft. 12 and 24 in. vitr. sewers. $60,000. Russell & Axon, 4903 Delmar Blvd., St. Louis, consult. engrs. Noted May 3.

N. Y., New York—Sept. 5 by J. J. Lyons, pres, Bronx Boro. County Bldg., 161st St. and Grand Concourse, sewers in East 231st St., Wallace, Tiemann, Laconia, Bryant and West Burnside Aves.

Pa., Pittsburgh—Sept. 6 (extended date), by R. Neff, archt., 501-A City County Bldg., 2 municipal incinerator plants, at N.S. Pittsburgh and Aspinwall, for City. $1,000,000. G. W. Schusler, City County Bldg., engr. R. Neff, City County Bldg., archt. Noted Aug. 9.

CONTRACTS AWARDED

Ia., Sioux City—City, Riverside Storm Sewer, to C. F. Lytle Constr. Co., Sioux City, $91,398. Est. $95,000. P.W.A. Bids Aug 16.

Minn., Minneapolis—City has been granted permission by P.W.A. to construct Sects. A and B, of North Minneapolis Interceptor Sewer in 2nd St. by day labor. P.W.A. at Washington reversed its decision. Est. $218,573. Noted Aug. 23, under "Proposed Work."

N. Y., Malone—City, sewage disposal plant and sewer lines, to Stillman Oliver Co., Chataguay. Est. $100,000. **P.W.A.** Noted Mar. 29.

N. Y., Orangeburg—Commissioner Dpt. Mental Hygiene, State Office Bldg., Albany, sewage disposal plant and water supply, at Rockland State Hospital, to Kucher Bros., Montvale, N. J., $60,000. Bids Aug. 8. Noted July 26.

O., Columbus—W. J. Lucks, dir. Service, Woodland Ave. Sewer, Sect. 2, involving 4,900 ft. 36 in. rein.-con. pipe, 17,000 cu.ft. excav., 4,900 ft. 8 in. vitr. pipe sub-drain, to Caffrey Griffin & Bohn, 301 M and M Bldg., Springfield, $58,115. **P.W.A.**

O., Shelby—Service Director, wrought pipe circulating lines and tile sewer and cooling tower basin at municipal light plant, to Simon Small & Sons Co., Mansfield, $18,214 and $1,930 respectively***wiring, to Kelso-Wagner Co., 134 West 28th St., Dayton, $11,950. Grand total $32,094. **P.W.A.**

Pa., Pittsburgh—See "Street and Roads."

Tex., Newcastle—City, J. Reagan, secy., complete sewerage system, tentatively awarded to Panhandle Contr. Co., Lubbock, $34,117. **P.W.A.** Noted July 26.

BRIDGES AND GRADE CROSSINGS

BIDS ASKED

Ia., Hampton—Sept. 7, by Franklin Co., E. D. Haecker, aud., 15 creosoted wood pile bridges from 16 to 162 ft. long, one 3 span I-beam bridge with 6 creosoted wood pile approaches. C. P. Rudisill, co. engr.

†Massachusetts—Sept. 6, by U. S. Eng., Boston, furnishing, installing lighting systems for 2 new highway bridges over Cape Cod Canal; adv. E.N.-R. Aug. 30.

Massachusetts—Sept. 11 (extended date), by Commonwealth of Massachusetts, Dpt. P. Wks., F. E. Lyman, comr., 100 Nashua St., Boston, superstructure for bridge over Saugus River between Lynn and Revere, incl. 2 structural steel shore spans 50 ft. each, 8 spans about 100 ft. each, 1 rolling lift bascule type draw span, also about 1,650 ft. bituminous macadam and 1,011 ft. bituminous concrete type "D" approaches. J. R. Worcester & Co., 79 Milk St., Boston, consult. engrs. Total est. $1,000,000. Noted Aug. 23.

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Mississippi—See "Streets and Roads."

Missouri—Sept. 6, by State Hy. Dpt., Jefferson City, constructing bridges in Marion, Gentry, Macon, Randolph, Carroll, Jefferson, St. Charles, Greene, Laclede, Howell, Shannon and Jasper Counties.

Pennsylvania—Sept. 7, at office S. S. Lewis, secy. Hys., Harrisburg, 750 ft. rein.-con. bridge and native stone or modified broken stone base course 16 ft. wide on approaches, 750 ft., R-109 Bridge 14, North Franklin Twp., Washington Co.; 266 ft. rein.con. bridge and rein.-con. pavement for approaches, 16 to 18 ft. wide, also grading shoulders on 266 ft. R-242, Bridge 11, Canton Twp., Washington Co.

South Carolina—Sept. 4, by State Hy. Dpt., Columbia, constructing 360 ft. treated timber, rein.-con., steel bridge over Sugar Creek, on Route 211, 4 mi. east of Fort Mill, Lancaster and York Counties, incl. 45 cu.yd. dry, 3,650 cu.yd. channel, 66 cu.yd. rock and 352 cu.yd. wet excav. $23,000. B. M. Sawyer, ch. hy. comr.

South Dakota—See "Streets and Roads."

†Wyoming—Sept. 6, by Pub. Rds., Denver, Colo., 2 bridges on Project NR-4-A2, south of Eustance Hy., Yellowstone Park. J. A. Elliott, Custom House, Denver, Colo., engr.

CONTRACTS AWARDED

Alabama—See "Streets and Roads."

Calif., San Francisco—Public Utilities Comn., City Hall, constructing timber trestle to support sections of Bay Crossing Pipe Line No. 2 over Marsh Lands to Dumbarton Strait, 19,300 ft. total length, to Barrett & Hilp, 918 Harrison St., $174,393. Bids July 27, awarded Aug. 14. Noted Aug. 9.

Illinois—Dpt. P. Wks. & Buildings, Div. Hys., Springfield, constructing bridge in Cook Co., to Deckert & McDowell, 53 West Jackson Blvd., Chicago, $79,462***2 bridges, Williamson Co., to Vincennes Bridge Co., Vincennes, Ind., $22,-363***structure for subway in Cook Co., to L. Balkin Builders, Inc., 1852 West Austin Ave., Chicago, $33,986***bridge in Edgar Co., to Zimmerly Bridge Co., Paris, $24,996***substructure for subway in Niles Center, Cook Co., to Keystone Builders, Inc., Chicago, $28,467***substructure for 2 subway structures in Cook Co., to M. J. McDermott & Co., 105 South Dearborn St., Chicago, $79,670***fabricating structural steel for subway structure, Cook Co., to American Bridge Co., 208 South LaSalle St., Chicago, $59,850***erecting steel for subway structure, Cook Co., to W. J. Howard, Inc., Chicago, $20,983***fabricating steel superstructure for bridge, in Cook Co., and steel for bridge over Calumet Canal, Cook Co., to McClintic Marshall Corp., 400 North Michigan Ave., Chicago, $60,314 and $58,855 respectively. Grand total $468,946. Bids Mar. 13 and 27, Apr. 11 and 18, May 22 and 29, June 19 and 26 and July 24. Noted May 24, June 21 and 28 and July 12.

Indiana—State Hy. Comn., Indianapolis, 2 bridges in Benton Co., to A. G Ryan & Sons, Chrisney, $16,401 est. $19,629; 2 bridges, Wayne Co., to J. R. Gates, Fort Wayne, $21,724 est. $29,555. Bids Aug. 7. Noted Aug. 2.

Indiana—State Hy. Comn., Indianapolis, constructing rein.-con. girder extension, in Lake Co., to Subway Eng. Co., 115 South Dearborn St., Chicago, Ill., $22,445 est. $23,851*** 2 bridges in Crawford and Dubois Counties, to R. P. Olinger, Huntingburg, $18,744 est. $23,-715. Bids Aug. 7. Noted Aug. 2.

†Massachusetts—U. S. Eng., Custom House, Boston, constructing superstructure railroad bridge over Cape Cod Canal at Buzzards Bay, to Phoenix Bridge Co., Phoenixville, Pa., $981,-010. Bids July 20.

Missouri — State Hy. Dpt., Jefferson City, bridges over Wench Creek, and over Phelen Branch, Franklin Co., to F. T. O'Dell Constr. Co., Hannibal***over Brush Creek and over Branch, St. Clair Co., to Kelly & Underwood, Granby***over Dry Branch, St. Charles Co., to Lay Constr. Co., North Kansas City***over Big Tarkio River Drainage Ditch, over Old Channel Big Tarkio River, both Holt Co., and over Bowman Branch, Nodaway Co., to T. J. Morris, St. Joseph. Total $82,487. Est. $91,652. Bids Aug. 10. Noted Aug. 2, under "Streets and Roads."

N. Y., Chazy—Delaware & Hudson R.R. Co., J. MacMartin, ch. engr., Albany, eliminating grade crossing, to American Pipe & Constr. Co., c/o owner or Box 508, Amsterdam, $148,484.

N. Y., New York—See "Streets and Roads."

North Carolina—State Hy. & P. Wks. Comn., Raleigh, underpass in Monroe, Route 20, Project 6921, Union Co., to F. A. Triplett, Chester, S. C., $40,511; structures on 9.81 mi. road from Nashville to intersection Route 95, Project 1621, to Gregory-Chandler Co., Inc., Virginia, Va. $18,931.

Ohio—O. W. Merrell, dir. Hys., Columbus, timber bridge over Turkey Run, timber bridge with steel beams, capping present stone abutments with concrete, 47.2 ft. span, 24 ft. roadway over Cherry Run, and rein.-con. culvert over Turkey Run and approaches, Sect. "B" Lancaster-Circleville Rd., Fairfield Co., concrete beam bridge over Plum Creek and approaches, Sect. "Clarksburg" Chillicothe-Atlanta Rd., Ross Co., to Ross Constr. Co., 1201 Virginia Ave., Columbus, $17,927 and $5,535 respectively***22 ft. span concrete slab bridge, and widening existing 19.4 ft. span concrete, steel beam bridge from 18 to 24 ft. by adding concrete slab extensions, Sect. "C" Ottawa-Napoleon Rd., Henry Co., to N. A. G. Sundt, Antwerp, $8,926***concrete beam bridge with steel beams, 57 ft. span, 36 ft. roadway, two 5 ft. sidewalks, Sect. "Seville" (South) Cleveland-Wooster Rd., Medina Co., to Bates & Barr, Mesopotamia, $16,665***140 ft. span steel truss bridge over Mahoning River, 6 mi. west of Warren known as the "Center of the World" Bridge cold laid asphaltic concrete paving 0.19 mi. roadway on Sect. "A" Twinsburg-Warren Rd., Trumbull Co., to Scott Miller & Son, St. Marys, $38,168. Grand total $87,221. Bids Aug. 17. Noted Aug. 9.

Pennsylvania—See 'Streets and Roads."

Pa., Pittsburgh—Allegheny Co., reconstructing roadway floor system and floor of approaches, new handrailing and sidewalks, structural repairs and cleaning and painting entire superstructure, 62nd St., to Farris Eng. Co., Empire Bldg., $58,678.

South Carolina—See "Streets and Roads."

Tex., Dallas—Dallas Co., 7 span 150 ft. steel timber bridge and approaches over Belt Line Road, to Austin Bridge Co., 1813 Clarence St., Dallas. Bids Aug. 20.

Vermont—Town of Landgrove, construction Utley Bridge in Landgrove (not P.W.A. project) and Sectmen town of Whitingham and G. W. Plumb, dist. hy. comr., Bennington, constructing Hancock Bridge in Whitingham (P.W.A. project), to T. J. Harvey & Son, Adams, Mass., $10,109 and $14,112 respectively***Town of Ludlow, bridge in Ludlow to D. E. O'Brien Constr. Co., 429 South Main St., Whitehall, N. Y., $8,708***Selectmen town of Stamford and G. W. Plumb, dist. hy. comr., Bennington, Cole and Basin Bridges in Stamford and Selectmen town of Readsboro and G. W. Plumb, dist. hy. comr., Bennington, Keith Bridge in Readsboro, to Flaherty & Mengual, Adams, Mass., $11,831 and $18,501 respectively***Selectmen town of Pawlet and G. W. Plumb, dist. hy. comr., Bennington, Smith Bridge in Pawlet, to B. A. Barton Constr. Co., Fort Ticonderoga, N. Y., $9,645. Grand total $72,906. **P.W.A.** Bids July 14 and Aug. 2.

Wash., Tacoma—Pierce Co., 1 span 150 ft. concrete bridge over Puyallup River, to Dolph Jones, 3515 North Proctor St., $35,911. Est. $28,000. Bids Aug. 13.

West Virginia—State Rd. Comn., Charleston, substructure for bridge in McDowell Co., to Pocahontas Constr. Co., Cass, $5,817***superstructure same bridge, to Monty Bros., Charleston, $8,911***bridges, Ohio Co., to C. C. Dodd Constr. Co., Spencer, $67,921***substructure for bridge in Wetzel Co., to Skeen Constr. Co., Point Pleasant, $20,321***superstructure same bridge, to Pittsburgh Des Moines Steel Co., Neville Island, Pittsburgh, Pa., $30,472. Grand total $133,442. **P.W.A.** Bids Aug. 21. Noted Aug. 16.

Ont., Welland—Stamford Twp., 44x77 ft. rein.-con. bridge over Michigan Central R.R. to Jerome Damore, 1472 Stanley St., $751,000. Noted July 12.

STREETS AND ROADS

BIDS ASKED

California—Sept. 12, by State Hy. Comn., Sacramento, grading, and road mix method oil treating 5.8 mi. hy. and constructing bridge over San Antonio Creek on hy. between Hollister Ave. and Pointed Cave Rd., Santa Barbara Co.; bituminous treated selected material surfacing 9.3 mi. hy. between west boundary and point 2.4 mi. south of Maricopa, Kern Co., C. H. Purcell, P. Wks. Bldg., Sacramento, engr.

California—Sept. 13, by State Hy. Comn., State Hy. Bldg., Los Angeles, grading, concrete paving 0.4 mi. hy. through Bloomington, San Bernardino Co. C. H. Purcell, P. Wks. Bldg., Sacramento, engr.

Colo., Colorado Springs—See "Contracts Awarded."

Connecticut—Sept. 10, by State Hy. Comn., Hartford, J. A. Macdonald, state hy. comr., waterbound macadam paving 3,100 ft. Long Hill Rd., Andover, P.W.A. Docket 5378; 12,423 ft. Bloomfield and Park Avenues, P.W.A. Docket 3834; trap rock waterbound paving 7,996 ft. Huckleberry Hill Rd., Avon; rolled bank run gravel paving 6,056 ft. Edgewood Rd., Hart St., Berlin; loose gravel surfacing 12 sections of 9,225 ft. hy. Lisbon; 19,742 ft. 6 sections hy. Pomfret.

Delaware—Sept. 19, by State Hy. Dpt., Dover, improving hys. Contrs. 390-N.R.H. 90A and C. and Contr. 330-N.R.H. 58, N.R.M. and N.R.H. 94, both Sussex Co.; Contr. 219C-N.R.M. 120 and Contr. 261A, N.R.H. 39, Unit 11, New Castle Co.; adv. E.N.-R. Aug. 30.

Ia., Hampton—Sept. 7, by Franklin Co., graveling 19.45 mi road; grading 11,955 mi. road, incl. 100 cu.yd. Class 1, 8,128 cu.yd. Class 2 66,204 cu.yd. Class 2a, and 6,725 cu.yd. Class 2a dragline excav. C. P. Rudisill, co. engr.

Ia., Iowa City—Sept. 7, by City, G. J. Dohrer, clk., vitr. lug type paving brick on 1 in. mastic cushion and filled with asphalt filler on 6½ in. concrete paving 9 blocks Burlington St., incl. 14,139 cu.yd. excav. J. F. Spratt, city engr.

†Maryland—Sept. 6, by Pub. Rds., Dpt. Agriculture, 419 Winder Bldg., Wash., D. C., con-

†Federal Government.

Streets and Roads (Continued)

structing 0.66 mi. road in Antietam Battlefield Site, Washington Co. H. J. Spelman, principal hy. engr.

Massachusetts—Sept. 4, by Commonwealth of Massachusetts, Dpt. P. Wks., F. E. Lyman, comr., 100 Nashua St., Boston, bituminous macadam surfacing 19,738 ft., also 41 ft. rein. con. bridge over New York, New Haven & Hartford R.R. in Randolph, and 14 ft. span concrete slab bridge over Farm River, in Braintree. P.W.A. Project R-51, Docket 5726. $205,000 loan and grant.

Mass., Boston—Sept. 4, by Dpt. P. Wks., C. J. Carven, comr., City Hall, granite block and sheet asphalt paving 1 mi. Southampton St. from Andrew Sq. to Massachusetts Ave. To exceed $30,000. P.W.A. project.

Mississippi—Sept. 11, by State Hy. Comn., E. D. Kenna, dir., Jackson, grading, drainage structures, bridges on 4.966 mi. Philadelphia-Louisville Hy., NRH 74-B and NRM 74-B, Winston Co., incl. 39,233 cu.yd. common earth excav. R. A. Harris, Jackson, engr.

Missouri—Sept. 6, by State Hy. Comn., Jefferson City, improving roads in Holt, Marion, Platte, Mississippi, Daviess, Gentry, Harrison, Macon, Mercer, Carroll, Randolph, Jackson, Pettis, Osage, St. Charles, Greene, Howell, New Madrid, Linn, Henry, Cass, Jasper, Grundy, Livingston, Adair, Putnam, Schuyler, Sullivan, Linn and Phelps Counties.

Nebraska—Sept. 7, by A. T. Lobdell, acting state engr. State Hy. Comn., Lincoln, paving 14 road projects. $447,400.

New Jersey—Sept. 10, by State Hy. Comn., Trenton, constructing 0.393 mi. Traffic Circle, on Route 30, Sect. 10A, at Washington's Crossing Rd., Mercer Co., incl. 5,800 cu.yd. unclass. excav. A. L. Grover, ch. clk.; adv. E.N.-R. Aug. 30.

†**New Mexico**—Sept. 10, by Pub. Rds., Denver, Colo., grading, oiling 12.934 mi. Project N.R. 15-A-2 to C-2, inclusive of Cedro Canyon, Forest Hy. Route, Bernalillo Co. J. A. Elliott, Custom House, Denver, Colo, engr.

New York—Sept. 11, by A. W. Brandt, comr. Hys., Albany, constructing roads and bridges in Queens Co.; reconstructing roads in Tioga, Queens, Orleans, Saratoga and Schenectady Counties; bridges in Cortland, Orange and Oswego Counties; adv. E.N.-R. Aug. 30.

N. Y., New York—Sept. 5, by J. J. Lyons, pres. Bronx Boro, County Bldg., 161st St. and Grand Concourse, granite block paving West Burnside Ave.; sheet asphalt on concrete paving Bronx Park East, Westchester Ave. and East 187th St.; grading, curbing sidewalks on Stanford and Barkley Aves.; repairing sidewalks and guard rails on East 176th St., etc.

North Dakota—Sept. 14 (extended date), by State Hy. Comn., Bismarck, graveling 5.237 mi. Michigan Rd. East, NRH 70A, Unit 1, NRM 70A, Unit 2, Nelson Co.; 11.562 mi. road east of Forbes, NRS 515, Dickey Co., N. D. and Brown and McPherson Counties, S. D., incl. 1,794 cu. yd. earth excav.; 16.298 mi. road west of Oberon, NRS 528, Benson Co., 5,709 cu.yd. earth excav.; 11.6 mi. road west of Wishek, NRH 315A, McIntosh Co.; 11.739 mi. road north and south of Elliot, NRS 483, Ransom Co., 7,238 cu.yd. earth excav.; 5.511 mi. Pingree West, NRS 491, and 14.036 mi. road east and west of Sidney, both Stutsman Co.; 11.122 mi. road east of Voss, and 5.548 mi. road south of Fairdale, NRS 510, both Walsh Co.; concrete paving 0.151 mi. in Watford City, NRM 312A, McKenzie Co., incl. 1.10 cu.yd. rock excav.; oiling, paving 0.704 mi. road in Granville, NRM 274B, McHenry Co.; 1.208 mi. in Cando, NRM 130 and NRM 311B, Towner Co.; 2,322 mi. road in Parshall, VanHook and Sanish, NRM 271A, NRM 284, NRM 301C, Mountrail Co.; 1.86 mi. road in Valley City East, NRM 12K, NRH 12J, Barnes Co.; 1.624 mi. road in Bowbells and Kenmare, NRM 258F, NRM 181, NRM 228, in Burke and Ward Counties; 0.686 mi. road in Hettinger, NRM 320A, Adams Co.; 0.919 mi. in Linton, NRM 119B, Emmons Co.; 1.098 mi. road in McClusky and Goodrich, NRM 209 and 218C, Sheridan Co.; grading, structures, 4.055 mi. road Dewar N. and S., NRH 338G, Walsh Co., 950 cu.yd. earth and 6,594 cu.yd. rock excav.; 4.386 mi. road north of Almont, NRS 472, Morton Co., 72,120 cu.yd. earth and 705 cu.yd. rock excav.; 3.912 mi. road south of Lehr, NRS 533 McIntosh Co., 40,743 cu.yd. unclass. excav.; 3.043 mi. north of Elliott, NRS 527, Ransom Co., 34,329 cu.yd. earth and 150 cu.yd. rock excav.; 7.124 mi. road east and west of Clifford, NRS 493, Traill Co., 74,432 cu.yd. earth and 225 cu.yd. rock excav.; 4.009 mi. south of Noonan, NRS 463, Divide Co., 53,271 cu.yd. unclass. excav.; 7.012 mi. road west of Garrison, NRS 471, McLean Co., 700 cu.yd. rock and 93,460 cu.yd. earth excav.; 5.518 mi. road northwest of Esmond, NRS 529, 72,620 cu.yd. unclass. excav.; and 4.765 mi. NRS 530, 64,765 cu.yd. earth and 125 cu.yd. rock excav., both Benson Co.; 3.385 mi. Lincoln Valley East, NRS 486, 40,947 cu.yd. earth and 300 cu.yd. rock excav.; 7.567 mi. Picardville Rd. N., NRS 487, 118,442 cu.yd. earth and 1,725 cu.yd. rock excav., both Sheridan Co.; landscaping east of Crystal Springs, Kidder Co. B. M. Salisbury, hy. comr. Noted Aug. 16.

Ohio—Sept. 7 by O. W. Merrell, dir. hys., Columbus, hot mixed asphaltic concrete paving 2.691 mi. Sect. "A-2" and "B" (part), Wilmington-Hillsboro Rd., Clinton Co., $103,840; concrete paving and landscaping 0.307 mi. Sect. "Troy" Dayton-Troy Rd., Miami Co., $21,123; grading, draining, concrete widening 2.449 mi. Sect. "K" Mt. Gilead-Mansfield Rd., Richland Co., $35,487; hot mixed asphaltic concrete widening and brick and hot mixed asphaltic concrete paving 2.486 mi. Sect. "H" Cuyahoga Falls-Kent Rd., Summit Co., $160,390.

Pa., Freedom—City taking bids grading, laying of concrete after grading completed on 3rd Ave., 50,500 sq.ft. cement sidewalk, 5,000 sq.yd. existing brick walk removed, 900 cu.yd. excav., 625 cu.yd. boiler cinders.

South Dakota—Sept. 6, by State Hy. Comn., Pierre, grading, paving, bridging roads in Lawrence, Clay, Spink, Sanborn, Roberts, Yankton, Campbell, Gregory, Jones, Marshall, Fall River, Hand, McPherson, Edmunds, Jerauld, Charles Mix, Potter, Lake, Douglas, Hamlin, Brookings, McCook, Brown, Lincoln, Ziebach, Kingsbury, Walworth, Lyman, Stanley, Mellette, Day, Pennington, Fall River and Corson Counties, F. D. Kriebs, secy.

Wisconsin—Sept. 11, by State Hy. Comr. and Douglas Co. Hy. Com., Superior, grading, draining 12.116 mi. County Trunk Hy. C and A Bardon Ave., Rd., incl. 64,154 cu.yd. earth, borrow, marsh and channel, 145 cu.yd. loose rock and 136 cu.yd. solid rock excav.; 3.995 mi. County Hy. F., 35,836 cu.yd. earth, borrow, marsh and channel and 60 cu.yd. loose rock excav.; 6,993 mi. County Trunk Hy. K, 29,756 cu.yd. earth, borrow, channel and marsh and 100 cu.yd. loose rock excav.; 14.891 mi. Coolidge Memorial Hy., 90,797 cu.yd. earth, borrow, marsh and channel and 325 cu.yd. loose rock excav.; constructing Nebagamon Creek Bridge, Coolidge Memorial Hy., 150 cu.yd. earth excav.

CONTRACTS AWARDED

Alabama—State Hy. Dpt., Montgomery, double bit. surface treating 16.168 mi. Escambia Co., to McVay Lindsey & Son, Panama City, Fla., $159,558***bridges on same road, to Austin Bros. Bridge Co., 1195 Mickleberry St., S.W., Atlanta, Ga., $39,248***concrete paving 6.232 mi. Sumpter Co. and bit. surfacing 0.684 mi. Blount Co., to Dunn Constr. Co., Inc., Birmingham, Lincoln Life Bldg., $78,644 and $18,716 respectively***grading, drainage 7.67 mi. hy. Hale and Marengo Counties, to C. C. Moore Constr. Co., Panama City, Fla., $61,801*** bit. surfacing 3.646 mi. hy. in Fayette, to Mitchell Bros. Constr. Co., 3828 1st Ave., S., Birmingham, $41,146. Grand total $399,113. P.W.A. Bids July 20.

Calif., Glendale — City Council, grading, asphaltic concrete paving, concrete curbing, guttering Verdugo Rd. from La Crescenta Ave. to North City Line, to Southwest Paving Co., 126 West 3rd St., Los Angeles, $33,324. Bids Aug. 7.

Colo., Colorado Springs—City, El Paso Co. and property owners, c/o E. Mosley, city mgr., oiling streets in Broadmoor, Ivywild and Cheyenne Districts, day labor, $76,918. F. O. Ray, city engr.

Illinois—Dpt. P. Wks. & Buildings, Div. Hys., Springfield, paving 0.47 mi. Cook Co., to Standard Paving Co., 1101 South Cicero Ave., Chicago, $18,981***4.44 mi. Williams Co., to Regen-Hardt Constr. Co., Cape Girardeau, Mo., $132,941***paving 0.89 mi. Cook Co., to Midwest Constr. Co., Chicago, $16,901*** 1.05 mi. road in Cook Co., to H. G. Goelitz Co., Oak Park, $53,460***5.6 mi. Fulton Co., to Birt Bros. Constr. Co., Decatur, $59,619*** 0.35 mi. Montgomery Co., to Hartmann Clark Bros. Co., Peoria, $26,999***0.89 mi. road in Winnebago Co., to G. Welsh, Dundee, $48,435 ***3.34 mi. Grundy Co., to G. R. Barr, Rochester, Ind., $87,431***1.18 mi. St. Clair Co., to Moore & Kreipke, East St. Louis, $34,384*** grading approaches 0.42 mi. road and 0.48 mi. road in Cook Co., to Central Teaming Co. and Kenwood Trucking & Teaming Co., 8459 Muskegon Ave., Chicago, $32,984 and $40,779 respectively***paving approaches 0.58 mi. in Cook Co., to Kreen & Dato, 936 North Michigan Ave., Chicago, $107,908*** 0.29 mi. at Cook Co., to Pronger Constr. Co., Blue Island, $46,394***0.33 mi. Cook Co., to Milburn Bros., Mount Prospect, $41,104. Grand total $748,320. Bids May 29, June 19 and 26, and July 24. Noted May 24, June 14 and 21 and July 12.

Ill., Gridley—Dpt. P. Wks. & Buildings, Div. Hys., Springfield, traffic bound surface course on 7.6078 mi. Sect. Y-MFT, near here, McLean Co., to Prothero & Willis, Bloomington, $25,788. Bids June 20.

Ill., Carlyle—Clinton Co., concrete paving 1.4678 mi. Sect. 3-L-MFT, State Aid Route 8, to F. C. Feutz, Paris, $29,625. Bids Aug. 18.

Indiana—State Hy. Comn., Indianapolis, constructing structure 12.25 mi. Rd. 13, in Wabash Co., to D.A.Y. Constr. Co., Marion, $24,014. Est. $27,852. Bids Aug. 7.

Indiana—State Hy. Comn., Indianapolis, structure construction on 20.65 mi. road in Wells and Allen Counties, to Brooks Constr. Co., Fort Wayne, $13,121 est. $16,315***4.03 mi. road in Putnam Co., to W. J. McGuire, Brazil, $7,537 est. $10,245***grading, structures 3.797 mi. road in Martin and Daviess Counties, to R. Rogers & Co., Bloomington, $39,577 est. $51,580. Grand total $60,235. P.W.A. Bids Aug. 7.

Indiana—State Hy. Comn., Indianapolis, concrete structures on 10.24 mi. Madison Co., to R. H. Ellis, Alexandria, $10,514 est. $10,952; 12.92 mi. road in LaPorte Co., to E. T. Strom, Gary, $12,819 est. $13,487. Bids July 31. Noted July 26.

Louisiana—State Hy. Comn., Baton Rouge, Tchefuncta River Bridge and west approach on Madisonville-Mandeville Hy., State Project 960-C, N.R.S. 233, St. Tammany Parish, to S. J. Walker, 8244 Roosevelt Pl., New Orleans, $44,757. P.W.A.

Michigan—State Hy. Dpt., Lansing, grading, shaping, draining, concrete surfacing 0.576 mi., N.R.M.-81-39, Contr. 1, Washtenaw Co., 52 and 64 ft. wide, to Vinton Constr. Co., Coldwater, $60,790. P.W.A. Bids July 13.

Missouri—State Hy. Dpt., Jefferson City, to S. G. Hayes & Co., Jefferson City, bituminous surfacing 4.391 mi. Sect. 80A, Hartville Rd. N., $12,006; 5 mi. Sect. 79B, same road $13,030; 4.78 mi. Sect. 81A, same road $13,446; 4.948 mi. Sect. 82B same road $15,027, all foregoing Wright Co.***to Midwest PreCote Co., Northwest 26th and Summitt Sts., Kansas City, 2.087 mi. Lamonte-Dresden Rd., Sect. M15A, $8,858; 3.566 mi. Sect. M17A, same road $21,212, both Pettis Co.***to Joyce Logan Co., Kansas City, 0.385 mi. Christian Co. $1,049; 4.878 mi. Morgan Co. $10,080; 3.594 mi. Galena-Route 65 Rd., Sect. 31A, $9,985; 4.883 mi. Sect. 30A, same road $14,906, both Stone Co.; 1.364 mi. Greenfield-Ash Grove Rd., Sect. 14B, $4,330; 2.042 mi. Sect. 17B, same road $5,304; 4.984 mi. Sect. 18 D, Greenfied-Ash Grove Rd., $11,200; 2.5 mi. Sect. 18E, same road $5,790; 2.5 mi. Sect. 18F, same road $6,445; 4.554 mi. Sect 19A, same road $10,442; 3.999 mi. Sect. 19B, same road $9,177, all foregoing Dade Co. ***to M. E. Gillioz, Monett, 3.25 mi. Springfield Rd. S., $9,851; 2.006 mi. Sect. 1A, same road $6,160, both Greene Co.***to E. M. Horan, Little Rock, Ark., 1.34 mi. Sect. 117A, Branson Rd. S., $3,059; 4.699 mi. Sect. 118A, same road $10,864; 4.733 mi. Sect. 119A, same road $10,998***to Carter Waters Corp., 2440 Pennway, Kansas City, 4.109 mi. Howell Co. $4,936; 3.847 mi. Eminence-Winona Rd., Sect. 42A, $4,696; 3.429 mi., same road Sect. M43A $4,320; 2.976 mi. Sect. M44A, same road $3,633, all foregoing Shannon Co.; 3.795 mi. Meadville Rd. N., Sect. 1A, $3,286; 3.684 mi. Sect. 2A, same road $3,341; 3.905 mi. Sect. 3A, same road $2,705***to Service Constr. Co., Poplar Bluff, grading 4.129 mi. Wayne Co. $13,887; 4.82 mi. Ozark Co. $28,294***to T. J. Morris, St. Joseph, 2.712 mi. Nodaway Co. $11,716; 3.371 mi. Corning-Craig Rd., Sect. 2, $24,167; 4.387 mi. Corning Rd. S., $5,122, both Holt Co.***to F. T. O'Dell Constr. Co., Hannibal, 3.954 mi. Catawissa-Pacific Rd., Sect. 1 $21,075; 1.402 mi., same road $1,680, both Franklin Co.; 1.314 mi. Sect. 2, same road $5,164; 0.611 mi. Sect. 2, same road $2,932, both Jefferson Co.***to Koss Constr. Co., 205 Old Colony Bldg., Des Moines, Ia., 2.216 mi. Paris-Monroe City Rd., Sect. 53B, $62,749; 2.06 mi. Sect. 52, same road $53,934; 2.226 mi. Sect. 28D, Route 24-Paris Rd., $63,618, all foregoing Monroe Co.***to Kelly & Underwood, Granby, 4.538 mi. St. Clair Co. $18,040*** to Skrainka Constr. Co., Security Bldg., St. Louis, 2.841 mi. Dunklin Co. $4,429***to J. L. Pohl, Nevada, 3.085 mi. Shannon Co. $2,114; 2.123 mi. St. Clair Co. $6,988***to Consolidated Paving & Material Co., St. Joseph, 4.792 mi. Harris-Route 6 Rd., $2,919; 3.807 mi. Sect. 2B, same road $3,663, both Sullivan Co.***to Lay Constr. Co., North Kansas City, 0.093 mi. St. Charles Co. $2,634; 1.143 mi. Through Memphis Rd., $623; 1.513 mi. Memphis Rd. West, $772, both Scotland Co.***to C. H. Atkinson Paving Co., Chillicothe, 1.985 mi. Buchanan Co. $94,783. Grand total $671,459. Rejected bids road in Iron Co. Bids Aug. 10. Noted Aug. 2.

Missouri—State Hy. Dpt., Jefferson City, to Granite Bituminous Paving Co., Railway Exch. Bldg., St. Louis, retread surfacing 3.567 mi. Miller Co. $17,240***to Imperial Trucking Corp., 1900 Central St., Kansas City, bituminous mat surfacing 4 mi. Ozark South Rd., $19,372; 4.1 mi. Sect. M3B, same road $20,740, both Christian Co.***to S. G. Hayes & Co., Jefferson City, 4.68 mi. Pulaski Co. $15,205; 0.72 mi. Phelps Co. $2,385***to Carter Waters Corp., 2440 Pennway, Kansas City, 0.692 mi. Alton-Thayer Rd., Sect. 52A, $2,077; 4.953 mi. Sect. 55B, same road $16,745; 1.292 mi. Sect. 56A, same road $4,589; 3.887 mi. same road Sect. 57A, $13,334; 4.852 mi. Sect. 60B, same road $16,961, all Oregon Co.***to M. E. Gillioz, Monett, 4.986 mi, Dade Co.-Route A Rd., Sect. 20A, $14,559; 5 mi. Sect. 22B, same road $14,583, both Greene Co.; 2.787 mi. Lebanon-Wright Rd., Sect. 75A, $7,978; 2.597 mi. Sect. 76A, same road $7,376; 4.988 mi. Sect. 77, same road $14,327; 4.859 mi. Sect. 78, same road $13,466, both LaClede Co.***to Porter-Dewitt Constr. Co., Kirkwood, 4.354 mi. Washington-Union Rd., Sect. M12A, $12,041; 4.442 mi. Sect. M11A, same road $12,785, both Franklin Co.***to Nevada Constr. Co., 1,533 mi. Route 39-Route Y Rd., $5,072; 3.539 mi. Miller-Mount Vernon Rd., Sect. 19A, $10,053; 4.638 mi. Sect. 18A, same road $13,320, all foregoing Lawrence Co.***to O. O. Fuller Constr. Co., Nevada, 0.559 mi. Lanxan-Pineyville Rd., Sect. 1B $1,389; 4.15 mi. Sect. 2B, same road $14,444; 5 mi. Pineville-Arkansas Line Rd., Sect. 4A, $14,145; 4.96 mi. Sect. 5A, same road $13,183, all foregoing McDonald Co.***to Midwest Precote Co., Northwest 25th and Summitt Sts., Kansas City, 3.098 mi. St. Clair-Fairplay Rd., Sect. 46E, $9,965; 2.256 mi. Sect. 46F, same road $7,569; 4.905 mi. Sect. 37A, same road $11,438; 4.751 mi. Sect. 48A, same road $11,645, all foregoing Polk Co.*** to Boyle-Pryor Constr. Co., 226 West 39th St., Kansas City, 3.299 mi. Macks Creek-Preston Rd., Sect. 72B, $9,715; 3.981 mi. Sect. 97B, same road $14,099, both Camden Co.; 4.801 mi.

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†*Federal Government.*

Streets and Roads (Continued)

Windsor-Route 65, Sect. 28B, $17,192; 4.671 mi., same road Sect. 29B, $11,840; 3.562 mi. Sect. 30B, same road $11,880; 3.77 mi. Mack Creek-Preston Rd., Sect. 95, $12,532; 3.7 mi. Sect. 95, same road $12,218, both Hickory Co. ***to E. T. Markham, Cape Girardeau, 4.32 mi. Arcadia-Glover Rd., $15,183; 4.28 mi., same road Sect. M4A, $16,324, both Iron Co.*** to Condon, Cunningham & Lemon, Kirkwood, grading, graveling 4.416 mi. Butler Co. $20,198. Grand total $479,166. Bids July 27. Noted July 26.

New Hampshire—State Hy. Dpt., Concord, 3 in. bituminous macadam on 4 in. broken stone base course on 6 in. gravel base course paving 2.37 mi. Whittier Rd., Meredith, Belknap Co., to Carlo Bianchi & Co., Inc., 200 West Central St., Framingham, Mass., $51,229; bituminous macadam paving 2.348 mi. Dartmouth College Rd., Winchester, N.R.A. Project, Trunk Line Route, Cheshire Co., to Arborio Rd. Constr. Co., Inc., 2 Wolcott Rd., Wilson, Conn., $63,694. **P.W.A.**

New Mexico—State Hy. Comn., Santa Fe, surfacing road in Taos Co., to F. Shufflebarger, Albuquerque, $4,898 est. $7,500***topping road in Hidalgo Co., to A. O. Peabody, Las Cruces, $63,149 est. $56,548***improving road in Springer Co., to Kirchhof-Hanes, Inc., Denver, Colo., and Albuquerque, $56,219 est. $60,000*** surfacing in Colfax Co., to Leone Bros., Trinidad, Colo., $6,993 est. $5,000***in Bernalillo and Torrance Counties, to L. R. Allison, Albuquerque, $19,432 est. $22,175***in Union Co., to Armstrong & Armstrong, Roswell, $35,646 ***culvert in Union Co., to Belt & Weckel, Clayton, $2,435 est. $3,000. Grand total $188,763. **P.W.A.** Rejected bids improving hys. in Clayton and Harding Counties. Bids Aug. 21. Noted Aug. 10.

N. Y., New York—New York Central R.R. Co., J. W. Pfau, ch. engr., 466 Lexington Ave., West Side improvement first section from 72nd to 79th St., involving construction of foundations and walls west of tracks for extension of the express highway, to G. J. Atwell Foundation Co., 136 East 57th St., $149,610. Bids July 31.

N. Y., St. George—J. A. Palma, pres. Richmond Boro, Boro Hall, asphalt block repaving Richmond Terrace, to Vanbro Constr. Co., 721 Arthur Kill Rd., $26,895***paving Railroad area to Richmond Ave., to J. E. Donovan, 2205 Richmond Terrace, Port Richmond, $28,521*** sewer in Victory Blvd., to G. Orrico, 50 Brittan Ave., West Brighton, $8,047. Grand total $63,463. Bids Aug. 8.

N. Y., St. George—J. A. Palma, pres. Richmond Boro, Boro Hall, repaving Richmond Terrace and Giffords Lane, to Vanbro Constr. Co., 721 Arthur Kill Rd., $16,872 and $48,058 respectively. Bids Aug. 15.

N. Y., Wingdale—Dpt. Mental Hygiene, State Office Bldg., Albany, roads and walks at Harlem Valley State Hospital, to Peckham Road Corp., 47 Mamaroneck Ave., White Plains, $41,513. Bids Aug. 8. Noted Aug. 2.

North Carolina—State Hy. & P. Wks. Comn., Raleigh, grading, crushed stone paving 4.7 mi. Project 6540, Mecklenburg Co., to Edwards Bros., Clinton, $23,452***structures on same road, to Hobbs-Peabody Constr. Co., Charlotte, N. C., $3,187***grading, crushed stone paving and structures 7.58 mi. Project 6696, Rowan Co., to Geo. R. Martin, Salisbury, $53,922*** concrete widening 0.5 mi. Project 6697, in Rockwell, Rowan Co., to L. S. Bradshaw, Salisbury, $5,203***bituminous surface treating 4.52 mi. Project 6260, Catawba Co., to Kiker & Yount, Reidsville, $15,423***concrete paving 0.1 mi. Project 9402, in Waynesville, Haywood Co., to L. Riddle & Co., Asheville, $4,535***bituminous surfacing 9.81 mi. Project 1621, Nash Co., to R. B. Tyler Co., 1446 Levering St., Louisville, Ky., $46,062***bituminous surface treatment 4.37 mi. Project 1304, Edgecombe Co., to Gregory-Chandler Co., Inc., Virgilina, Va., $14,234. Grand total $166,108. Bids Aug. 7. Noted Aug. 2.

Ohio—O. W. Merrell, dir. hys., Columbus, salvaged brick on concrete base paving 0.160 mi. road and 0.139 mi. road on Ohio State University Campus, Franklin Co., to Robert J. Dienst, 297 South High St., Columbus, $9,258 and $7,502 respectively***concrete paving 0.178 mi. Sect. "N" (part) Cincinnati-Batavia Rd., Hamilton Co. and constructing retaining wall, furnishing and driving steel sheet piling for bridge over Dry Run, to Temple Foundation, 1425 Queen City Ave., Cincinnati, $25,367*** bituminous coated aggregate surface 12.69 mi. various sections Findlay-Upper Sandusky Rd., Hancock and Wyandot Counties, to C. E. Edgington, 1220 Miami St., Findlay, $69,843*** grading, draining, widening and cold mixed asphaltic concrete paving 2.6655 mi. Sect. "C" (part) Marysville-Kenton Rd., Hardin Co., to Churchill Inc., 835 East North St., Lima, $61,865***concrete paving 0.433 mi. Sect. "O" (part) and "P" (part) and 0.406 mi. Sect. "N" (part) and "S" (part) Oberlin-Norwalk Rd., Lorain Co., to Erie Constr. & Excavating Co., and Howard C. Herring, 991 Parton Rd., Cleveland, $18,349 and $24,416 respectively***grading, draining, brick on concrete widening 0.529 mi. Sect. "C" (part) Toledo-Ann Arbor Rd., Lucas Co., and concrete paving 0.4861 mi. Sect. "A" (part) Montpelier-North Rd., Williams Co., to Lauder & Son, Inc., Box 52, Station E, Toledo, $31,060 and $15,259 respectively*** 0.307 mi. Sect. "Troy" (part) Dayton-Troy Rd., Miami Co., to Davis-Hydaker Co., Spencerville, $20,912***bituminous surface treatment 0.2066 mi. Sect. "C" (part) Newark-New Lexington Rd., Perry Co., to Louis Dehmer, Tiffin, $5,548 ***widening and bituminous concrete or Westphalt resurfacing 0.529 mi. Sect. "Wooster" (part) Cleveland-Wooster Rd., Wayne Co., to Holmes Constr. Co., Palmer St., Wooster, $12,728***traffic bound macadam paving 1.619 mi. Sect. "B" (part) Ashland-Wooster Rd., Wayne Co., to Loesch & Green Constr. Co., 4311 West 32nd St., Cleveland, $34,162. Grand total $336,269. Bids Aug. 17. Noted Aug. 9.

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Ohio—O. W. Merrell, dir. Hys., Columbus, concrete paving 1.762 mi. Sect. "L-1" Salem-Unity Rd., Columbiana Co., to Urban Bros., 328 Ninth St. S.W., Massillon, $51,436***concrete paving 4.017 mi. Sect. "I" Kalida-Lima Rd., Putnam Co., to Hinton & Smalley, Celina, $118,954***60 ft. span concrete bridge with steel beams 24 ft. roadway over Honey Run and approaches of traffic bound macadam, Sect. "B-1" Millersburg-Wooster Rd., Holmes Co., to Purdy Constr. Co., 408 Park Ave. W., Mansfield, $9,752. Grand total $180,242. Bids Aug. 18. Noted Aug. 9.

Ohio—O. W. Merrell, dir. Hys., Columbus, removing curbs, building standard 8 ft. berm on one side, widen drainage structures 6.141 mi. Sects. "A-1", "A-2" and "A-3", Piqua-Troy Rd., Miami Co., to Davis-Hydaker Co., Spencerville, $34,723.

†O., Dayton—Con. Q.M., concrete roads, sidewalks, at Wright Field, to Finke Eng. Co., Dayton, $4,980. Bids Aug. 14.

O., St. Bernard—City paving track area with 7 and 8 in. concrete, resurfacing balance with 3 in. sheet asphalt, walks, water, etc., north ½ of Mitchell Ave., to Andrews Asphalt Paving Co., Hamilton, $39,330. Est. $55,000. **P.W.A.**

Pennsylvania—At office S. S. Lewis, secy. Hys., Harrisburg, rein.-con. paving 3.11 mi. R-34, Sect. 1-A, Silver Spring and Middlesex Twps., Cumberland Co., to Holmes Constr. Co., Wooster, O., $128,232***bituminous penetration or Spec. "E" on modified broken stone paving 2.78 mi. and one rein.-con. and one rein.-con. arch bridges, R-705, Parks Twp., Armstrong Co., to Connell & Laub, 51 Woodcrust Ave., Dayton, O., $90,702***rein.-con. paving 3.01 mi. and 5 rein.-con. structures, R-200-367, Sect. 3, city of Corry, Crawford and Erie Counties, to Geo. S. Mallert-Weidner Co., Medina, O., $110,675***one 96 ft. steel stringer bridge, R-294, Wayne Twp., Crawford Co., to Corry Bridge & Supply Co., Corry, $10,181 ***rein.-con. paving 1.94 mi. and one rein.-con. arch bridge R-260 Sects. R-7 and R-3, Catharine and Morris Twps., Blair and Huntingdon Counties, and rein.-con. paving 0.94 mi. R-33, Oliver Twp., Mifflin Co., to L. M. Hutchison, Orbisonia, $88,004 and $35,646 respectively***rein.-con. paving 2.42 mi. and one rein.-con. bridge, R-126, West Manchester Twp., York Co., to D. L. Risser, 713 Walnut St., Lebanon, $141,438. Grand total $604,878. Bids Aug. 10.

Pennsylvania—At office S. S. Lewis, secy. Hys., Harrisburg, bituminous penetration surface course paving 4.05 mi. R-278, Sect. 5, Greene and Hanover Twps., Beaver Co., to D. W. Challis & Sons, Inc., Locust and Centennial Ave., Sewickley, $107,863***dual type paving, rein.-con. and one rein.-con. arch bridge R-131, Sect. 5, London Grove and Penn Twps., Chester Co., to H. R. Miller, Box 1235, Lancaster, $133,736 ***rein.-con. paving 2.04 mi. and 2 rein.-con. bridges, R-161, Sects. 9-A and 9-B, Coal and Mt. Carmel Twps., Northumberland Co., to Dick-Smith Eng. Corp., 913 Markel Bank, Hazelton, $124,032. Grand total $365,631. Noted Aug. 23.

Pennsylvania—At office S. S. Lewis secy. Hys., Harrisburg, dual type rein.-con. and Spec. E on stone base paving 4,471 ft. also 1 rein.-con. structure, R-126, Oxford Twp., Adams Co., to John Swanger, Brenneman Bldg., Lancaster, $53,446; plate girder and pipe truss bridge, rein.-con paving 886 ft. R-161, Sect. 5, St. Clair Boro, Schuylkill Co., to Thos. Sheanhan, Box 508, Hagerstown, Md., $41,175. Bids Aug. 10.

Pa., Pittsburgh—City, to D. Pavia, 331 Ladson St., grading and improving Sophia Evert Playground, $16,033***to Bucci Constr. Co., 375 Boquet St., catch basins, etc., in Liberty Ave., $1,541; public sewer in Potomac Ave., $1,686; Library Rd., $1,075***to M. O'Herron Co., South 20th and McKean Sts., grading, paving, curbing Wellesley Ave., $5,873***to W. S. Rae, Oliver Bldg., concrete curb and guard, Sylvan Ave. Bridge, $1,715; steel curb guard, South 22nd St. Bridge, $3,597***to Henry Butch, 2 Emma St., concrete wall and drain, Heths Run Bridge, $1,347. Grand total $32,867.

South Carolina—State Hy. Dpt., Columbia, colprovia paving 5.7 mi. NRH 359, Sumter Co., to Espy Paving & Constr. Co., Savannah, Ga., $98,421***bituminous surfacing 0.5 mi. NRM 250, Florence Co., by own forces; rein.-con. bridge NRH 359, Sumter Co., to Wannamaker & Weeks, Orangeburg, $12,551***concrete piers and removing railroad embankment of underpass and widening bridge over Creek, Greenville Co., to Rickenbacker Constr. Co., Union, $14,305. **P.W.A.** Bids Aug. 14. Noted Aug. 9.

South Carolina—State Hy. Dpt., Columbia, grading 6 mi. Route 177, Spartanburg Co., to W. C. Sheperd, 347 Elizabeth St., Atlanta, Ga., $32,489. **P.W.A.** Bids Aug. 21. Noted Aug. 16.

†Va., Langley Field—Con. Q. M., grading, etc., to A. G. Pinkston, Norfolk, $8,546. Bids July 31.

Washington—State Hy. Dpt., Olympia, improving 1.751 mi. road in Pacific Co., to McGregor & McCealn, Astoria, Ore., $51,157*** grading, bridging, oiled crushed stone [illegible] approaches 0.944 mi. road in Yakima Co., to Elliott & Co., Inc., 2155 Northlake Ave., Seattle, $94,574***concrete paving 0.222 mi. Whatcom Co., to F. Rordin, 2515 East Olive St., Seattle, $17,900. Grand total $163,631. Bids Aug. 7, awarded Aug. 2.

†Wash., Fort Lewis—Con. Q.M., paving, [illegible] walks, curbs, etc., to J. Warner, Tacoma, $51,108. Bids Aug. 16.

West Virginia—State Rd. Comn., Charleston, to Murphy Constr. Co., Morgantown, improving road in Calhoun and Wirt Counties, $11,[illegible]18; in Doddridge Co., $38,555***to Parkersburg Constr. Co., Parksburg in Doddridge Co., $53,069***to Southern Ohio Quarries Co., Chillicothe O., in Fayette Co., $12,936; in Raleigh Co., $37,434; in Roane Co., $8,393***to Monogah Constr. Co., Fairmont, in Grant Co., $46,747***to Triangle Eng. Co., Wheeling in Hancock Co., $17,858***to Pocahontas Constr. Co., Cass, in Nicholas Co., $28,983. Grand total $254,733. **P.W.A.** Bids Aug. 21. Noted Aug. 16.

Wyoming — State Hy. Comn., Cheyenne, to A. H. Read, Cheyenne, oil base stabilization 6.842 mi. road, Natrona Co, $11,931; grading, draining, oil treating 18.337 mi. Laramie and Goshen Counties and 4.122 mi. Goshen Co, $78,868; base course surfacing 18.357 mi. Niobrara Co., $54,600***to Inland Constr. Co., 3867 Leavenworth St., Omaha, Neb., oil treating 21.579 mi. Sheridan and Campbell Counties $125,187; 15.982 mi. Crook and Weston Counties $84,026***to J. M. Keahey, Cheyenne, grading, draining, base couse surfacing 3.466 mi. Weston Co. $9,595***to Northwestern Eng. Co., Rapid City, S. D., oil treating 16.106 mi. Sweetwater Co. $93,872; 5.992 mi. Sheridan Co. $28,478; placing seal coat with stone chips on 17.6 mi. Johnson Co. $4,918***to S. F. Ronde, Sheridan, base course surfacing 5.98 mi. Crook Co. $13,375***to Blanchard Bros. Constr. Co., 1641 South Logan St., Denver, Colo., 2.477 mi. Sweetwater Co. $2,635***to E. Selander, Greeley, Colo., grading Lincoln Co. $64,502*** to Swensen Lumber Co., Laramie, bridge group on same road $56,418***to Central States Constr. Co., Cheyenne, grading, crusher run surfacing 0.279 mi. Albany Co. $4,860***to C. M. Smith, Theropolis, bridge over little Red Creek, Fremont Co. $2,268. Grand total $635,533. **P.W.A.** Bids Aug. 17. Noted Aug. 9.

†Puerto Rico—U. S. Eng., 2.3 kilometers of macadam road and 12 culverts, near Guayama, to Antonio T. Molini & Seguando Alsonso, San Juan, $32,192. Bids July 30.

EARTHWORK, IRRIGATION DRAINAGE AND WATERWAYS

PROPOSED WORK

†Calif., Indio — Coachella Valley Irrigation Dist. plans extending All American Canal to Indio on east side Coachella Valley and back to West side, incl. construction 115 mi. canal, 33 mi. to be concrete lined, 79 siphons and conduits for crossing various washes to benefit 120,000 acres. $10,000,000.

BIDS ASKED

†Fla., Tampa—Sept. 20, by U. S. Eng., Jacksonville, dredging 2,596,400 cu.yd. material from Tampa Bay Channel, Tampa Harbor; adv. E.N.-R. Aug. 30.

†Idaho, Shoshone—Sept. 14, by Bd. Directors Big Wood Canal Co., reconstructing outlet works and installing emergency gates, needle valves in Big Wood Canal Company's Magic Dam, on Big Wood River, about 25 mi. north of here. P.W.A. project; adv. E.N.-R. Aug. 30. Noted Nov. 23.

†Ind., Indiana Harbor—Sept. 4, by U. S. Eng., Chicago, Ill., dredging 180,200 cu.yd. material from Indiana Harbor; adv. E.N.-R. Aug. 30.

†Ky., Green River—Sept. 4, by U. S. Eng., Box 59, Louisville, constructing operation building complete with equipment at Lock and Dam 5, Green River.

†Louisiana—Sept. 11, by U. S. Eng., foot Prytania St., New Orleans, constructing 3,250,000 cu.yd. earthwork in 2nd New Orleans Levee Dist.

†Louisiana—Sept. 14, by U. S. Eng., P. O. Box 4970, Jacksonville, Fla., 17 drainage spillway structures along north and south banks of St. Lucie Canal, between Lock 1 near Lake Okeechobee and Lock 2, about 10 mi. west of Stuart.

†Maryland—Sept. 14, by U. S. Eng., Baltimore, dredging 33,000 cu.yd. from Kent Island Narrows, Chester River; adv. E.N.-R. Aug. 30.

†Mich., Port Huron—Sept. 14, by U. S. Eng. Federal Bldg., Detroit, dredging 979,547 cu.yd. from channel in St. Clair River between Port Huron and Marysville; adv. E.N.-R. Aug. 30.

†Missouri—Sept. 6, by U. S. Eng., Rock Island, Ill., 40,000 cu.yd. rock and brush, 1,200 cu.yd. earth for repairing dams in Mississippi River between Wisconsin River and Clarksville, Mo.

†Neb., Columbus — Sept. 14, by Secretary Loup River Public Power Dist., Thurston Hotel.

†Federal Government.

Earthwork, etc. (Continued)

2424 13th St., completing canal excavation and earthwork, from Sta. 700 + 00 to about Sta. 1225 + 00, incl. 3,000,000 cu.yd. earth excav., near Monroe and here. C. B. Fricke, pres. Noted Aug. 23.

†**N. Y., Dunkirk**—Sept. 7, by U. S. Eng., Federal Bldg., Buffalo, dredging 39,000 cu.yd. low measurement material other than ledge rock.

†**R. I., New Shoreham**—Sept. 4, by U. S. Eng., Custom House, Providence, dredging several thousand cu.yd. at Block Island.

†**South Carolina**—Sept. 13, by U. S. Eng., Charleston, dredging 1,758,252 cu.yd. from Intracoastal Waterway, Winyah Bay to Charleston.

Tex., Mission—Hidalgo Co. Water Control & Imprv. Dist. 7, taking bids irrigation system involving 2,330,000 sq.ft. concrete canal lining, and laying 11½ mi. 12- to 30-in. concrete pipe line. $557,000. P.W.A. loan granted. E. P. Congdon, Mission, engr.

N. S., Brooklyn—Sept. 4, by Secretary Dpt. P. Wks., Ottawa, Ont., breakwater extension, involving 294,000 cu.yd. cribwork fully ballasted, 16,600 ft. B.M. creosoted hardwood sheathing. $75,000. K. M. Cameron, Ottawa, engr.

CONTRACTS AWARDED

†**Ariz., Parker**—Bureau Reclamation, Grant Bldg., Los Angeles, Calif., constructing Parker Dam and appurtenant works near Parker, Ariz., and Earp, Calif., to Six Companies, Inc., Boulder City, Nev., $4,239,834. Bids July 26, awarded Aug. 23. Noted June 21.

†**Ark., Pine Bluff** — U. S. Eng., Memphis, Tenn., 210 lin. ft. woven willow mattress with pocket mattresses and repairing 750 lin. ft. rip rap bank paving on Arkansas River, to W. P. McGeorge, Box 995, $6,826. Bids July 25.

Calif., Los Angeles—Flood Control Dist., E. C. Eaton, engr., 205 South Bway., rein.-con. conduit in Ballona Creek from LaBrea Ave. to Redondo Blvd., involving 7,300 cu.yd. excav., 7,300 cu.yd. fill, 3,950 cu.yd. rein.-con., to United Concrete Pipe Co., Torrance, Schedules (1) $30,319 (2) $29,924, est. exceeds $50,000 •••furnishing 6,000 bbl. cement for same, to Southwestern Portland Cement Co., 727 West 7th St., $14,700•••750,940 lb. reinforcing steel, to Los Angeles Iron & Steel Co., 1522 Santa Fe Ave., $21,421. Grand total $96,364. Bids July 30, awarded Aug. 20. Noted Aug. 9.

Ind., Hammond—See "Waterworks."

Kansas—State Hy. Comn., Ashland, bank protection on Cimarron River, Project 283-1-K-1481 Clark Co., to Kellner Jetty Co., Topeka, $13,783.

†**Louisiana** — U. S. Eng., 2nd Dist., foot Prytania St., New Orleans, constructing 886,000 cu.yd. levees, to Carlan, Inc., 708 American Bank Bldg., New Orleans, $96,485. Bids Aug. 8. Noted Aug. 2.

†**Maine**—U. S. Eng., Custom House, Boston, Mass., repairing, extending rubble stone breakwater, to J. Forward, 38 Powder House Rd., Medford, Mass., $7,380. Bids Aug. 20, awarded Aug. 24. Noted Aug. 9.

†**Missouri**—U. S. Eng., Kansas City, constructing dikes in Missouri River, at Bellevue Reach and St. Mary's Bend and dikes, revetment and abatis at St. Mary's and Plattsmouth Bends, to Kansas City Bridge Co., 7th St. and Kaw River, Kansas City, $337,023 and $1,181,252 respectively. Bids Aug. 17.

†**Missouri**—U. S. Eng., Kansas City, dikes and revetment in Missouri River at Bellevue Reach, to Paton Tully Transportation Co., North 2nd St., Memphis, Tenn., $734,092; dikes and revetment in Gibson and Manama Bends, to W. A. Ross Constr. Co., 25th and Summit Sts., Kansas City, $437,631. Bids Aug. 15.

†**Missouri**—U. S. Eng., 428 Custom House, St. Louis, constructing dikes in Mississippi River at Liberty, Crain Island, to Woods Bros. Constr. Co., Lincoln, Neb., $90,740. Bids July 30.

†**Nebraska**—U. S. Eng., Kansas City, Mo., dikes and revetment at Copeland and Nebraska Bends in Missouri River, to Bilhorn, Bower & Peters, Inc., Railway Exch. Bldg., St. Louis, Mo., $742,670•••at Copeland Bend and at Civil and Copeland Bends, to M. A. Wogan, 320 Karns St., Kansas City, Mo., $218,688 and $431,723 respectively•••at Van Horns and Civil Bends, to W. P. McGeorge, Pine Bluff, Ark., $592,462. Grand total $1,985,543. Bids Aug. 8 and 9.

†**Nebraska**—U. S. Eng., Kansas City, Mo., constructing dikes, revetment and abatis in Missouri River at Barney Bend to Nishnabotna Bend, near Peru, Neb., to Woods Bros. Constr. Co., 132 South 13th St., Lincoln, $687,172; dikes, revetment, etc. in Missouri River at Kansas Bend to Peru Bend, Neb., to Kansas City Bridge Co., 7th and Kaw Sts., Kansas City, Mo., $452,660. Bids Aug. 13.

†**Nebraska**—U. S. Eng., Kansas City, Mo., constructing 3,100 ft. dikes and 6,200 ft. revetment in Missouri River, at Blair Bend, to C. F. Lytle, Sioux City, Ia., $209,277•••6,500 ft. pile dikes at Langdon Bend, near Nemaha City, to Kansas City Bridge Co., 7th St. and Kaw River, Kansas City, Mo., $182,911••• 12,400 ft. dikes and 1,000 ft. revetment at Hamburg and Barney Bends, Minersville, to Hamman Constr. Co., New York Life Bldg., Kansas City, Mo., $346,780. Grand total $738,968. Bids Aug. 20 and 21.

Ohio—T. S. Brindle, dir. P. Wks., Columbus, repairs to dam, in Walholding Canal, incl. 155 cu.yd. concrete steel piling, to C. P. Brindle, 311 South Wall St., Columbus, $13,034. Bids Aug. 15. F. O. Kruzel, State Office Bldg., Columbus, engr., Coshocton Co.

†**Oregon**—Bureau Reclamation, Portland, exploration drilling at Bonneville Dam site, to Cannon Bros., Compton, Calif., $7,000.

†**Texas**—U. S. Eng., Galveston, dredging 23,700 cu.yd. from highway ferry channel at Bolivar Peninsula, Galveston Harbor, to Luedke Dredging Co., Galveston, $8,058. Bids Aug. 20.

†**Tex., Brownsville**—U. S. Eng., Galveston, dredging in Brazos Island Harbor, to Atlantic, Gulf & Pacific Co., 13 Park Row, New York, $1,485,903. Bids Aug. 1. Noted July 19.

Nova Scotia—See "Unclassified."

Ont., Hamilton—Secretary Dpt. P. Wks., Ottawa, dredging, to Canada Dredge & Dock Ltd., Harbor Comn. Bldg., Toronto, $18,050. Est. $45,000. Bids July 31.

Que., Laprairie—Dpt. P. Wks., Ottawa, Ont., protection wall, to J. O. Proulx & A. Billet, Montreal, $11,987.

UNCLASSIFIED

PROPOSED WORK

N. H., Durham—STADIUM, etc.—University of New Hampshire, E. W. Lewis, pres., Durham, plans football stadium, seating capacity 5,000, to exceed $30,000. **Maturity indefinite;** and is now building baseball bleachers, 1,700 seating capacity by day labor. S. Hadden, 607 5th Ave., New York, engr.

BIDS ASKED

California—PIPE LINE, etc.—Standard Oil Co., Standard Oil Bldg., San Francisco, taking bids 108 mi. pipe line from Kettleman Hills wells to submarine loading base at Estero Bay, San Luis Obispo Co., incl. stringing pipe, ditching, welding, backfilling; also constructing tankage to store 600,000 bbl. oil, at Rio Bravo, Kern Co. and 900,000 bbl. at Estero Bay, San Luis Obispo Co. Alternate bids will be considered for removing existing tanks at Pond, Kern Co. and re-erecting on new sites and for constructing new tanks. Owner will furnish 12 in. pipe, it being removed from existing pipe line from Bakersfield to Richmond. $4,000,000. Contracts for removing 20 cottages from existing to new line, boring water wells, tank foundations and 750,000 bbl. earth reservoir, concrete lined at Estero Bay will be let at later date. Noted Aug. 23.

†**Ky., Fort Knox** — LIGHTING SYSTEM — Sept. 5, by Con. Q.M., constructing and completing street lighting system.

†**Md., Aberdeen**—LIGHTING SYSTEM—Sept. 4, by Con. Q.M., U. S. Proving Grounds, night lighting system at Proving Grounds.

†**Md., Annapolis**—TOWER, etc.—Sept. 5, by Yards & Docks, Navy Dpt., Wash., D. C., tower alterations and steel radio, Spec. 7733.

Mo., St. Louis — LIGHTING FACILITIES — Sept. 11, by Bd. P. Serv., City Hall, maintaining gas transmission and light equipment and furnishing gas for 3-year period beginning Oct. 1, 1934. $121,380; furnishing, maintaining standards and furnishing naptha for street lighting in certain district, for 3-year period beginning Oct. 1, 1934. $450,000. Private plans.

N. Y., Buffalo—RAILROAD SIDING—See "Contracts Awarded."

N. Y., New York—COAL SHELTER—New York Edison Co., 4 Irving Pl., bids about Feb. 1, general contract coal shelter, 800 East 14th S. $150,000. F. Kiess, 4 Irving Pl., archts. Noted Aug. 16.

†**C. Z., France Field**—HANGARS—Sept. 26, (extended date), by Con. Q.M., constructing hangars and appurtenances at France Field; adv. E.N.-R. Aug. 30. Noted Aug. 30.

CONTRACTS AWARDED

†**Calif., San Rafael**—BOAT HOUSE, etc.—Con. Q.M., boat house and decking, to F. J. Early, Jr., 369 Pine St., San Francisco, $8,624. Bids Aug. 15.

†**D. C., Wash.**—HIGH PRESSURE STEAM LINE—Con. Q.M., high pressure steam line for Red Cross Building, to H. Sands & Co., New York, $4,216. Bids Aug. 23.

Ia., Davenport — RADIATOR ANTENNA — Station WHO-WOC, D. D. Palmer, genl. mgr., Des Moines, constructing 520 ft. vertical radiator antenna for Station WHO-WOC, to Blaw-Knox Co., Blawnox Bldg., Pittsburgh, Pa., $30,000.

†**La., New Orleans**—U. S. Eng., repairing U. S. Dredge "Detroit Wayne," to Johnson Iron Wks. Dry Dock & Shipbuilding Co., 100 Morgan St., $15,203. Bids Aug. 3.

Mass., Revere — OIL TERMINAL — Hartol Products Co., 117 Liberty St., New York, constructing 250,000 bbl. capacity oil terminal, day labor and separation contracts•••foundations, to Western Foundation Co., 308 West Washington St., Chicago, Ill.•••tanks, to Chicago Bridge & Iron Wks., 37 West Van Bureau St., Chicago, Ill. Est. exceeds $250,000.

N. H., Durham—STADIUM, etc.—See "Proposed Work."

N. J., Skillman — UNDERGROUND STEAM CONDUIT, etc.—Dpt. Institutions & Agencies, State Office Bldg., Trenton, underground steam conduit, to H. W. Porter, 825 Freilnghuysen Ave., Newark, $33,000; return pipes, to G. J. Tobin, 187 North Ave., Plainfield, $7,247. **P.W.A.** Bids July 26.

N. Y., Brooklyn — STORAGE BINS, etc.—Eskay Coal & Fuel Co., 1255 38th St., storage bins and coal pockets, 39th St. and 2nd Ave., to Derrick & Hoist Constr. Corp., 50 Bank St., New York. Est. about $28,000. Noted Aug. 16.

N. Y., Buffalo—RAILROAD SIDING—Delaware, Lackawanna & Western R.R. Co., M. H. Doughty, engr. maintenance and way, Hoboken, N. J., railroad siding, in Columbia St. and across Perry St., day labor and separate contracts. To exceed $17,000.

N. Y., New York — PIER SHEDS — G. F. Driscoll, general contractor, 550 Union St., Brooklyn, 8,600 tons steel for pier sheds, for Dpt. Docks, to McClintic Marshall Corp., Pittsburgh, Pa. To exceed $300,000. Noted Aug. 16, under "Contracts Awarded."

North Carolina—ELECTRICAL WORK—State Hy. & P. Wks., Raleigh, electrical work for 2 county prison camps, one 1½ mi. from Boone, Route 60, Watauga Co., and other the Yancey Prison camp, 4 mi. southwest of Burnsville, Yancey Co., to Mill & Marine Co., Gastonia, $2,450. Noted Aug. 23.

Pa., Pittsburgh—PLAYGROUND—See "Streets and Roads."

Nova Scotia—WHARF SIDING, etc.—Dpt. P. Wks., Ottawa, Ont., wharf siding at Huntsport, to R. and A. Parsons, Walton, $14,627 est. $17,000; dredging in East River, to Beacon Dredging Co., Halifax, $17,000 est. $25,000. H. M. Cameron, Ottawa, Ont., engr.

MATERIALS AND EQUIPMENT

BIDS ASKED

CRUSHED AGGREGATE, etc.—**Indiana**—Sept. 5, by J. D. Adams, chn. State Hy. Comn., J. D. Adams, chn., Indianapolis, 600-1,000 tons crushed aggregate on State Rd. 22; 830-890 tons calcium chloride to various points; hardware, f.o.b. Indianapolis.

ROCK ASPHALT, etc.—**Indiana**—Sept. 4, by J. D. Adams, chn. State Hy. Comn., Indianapolis, 50 tons rock asphalt, f.o.b. Wabash; 400-600 tons crushed aggregate, f.o.b. Flora; 135-175 bbl. portland cement, f.o.b. LaPorte; 800-1,100 tons crushed aggregate, gravel or slag, f.o.b. Mexico; 600-800 tons crushed aggregate, f.o.b Miami or Bennett; 400-600 tons crushed aggregate, gravel or slag on SR31; 6 in. drilled well at Junction 34 and 41, near Veedersburg; truck automobile, tractor parts, hardware and hot water heaters, f.o.b. Indianapolis.

PIPE, etc.—**Covington, Ind.**—City, M. Dennis, clk., taking bids 3,900-4,000 ft. 12 in. and 900-1,000 ft. 8 in. vitr. pipe; 10,000-15,000 common brick; 30-40 bbl. brixment cement; 15 bbl. portland cement.

BREWERY EQUIPMENT—**Indianapolis, Ind.**—Richard Lieber Brewing Co., 1254 South West St., taking bids brewery, mechanical equipment, copper piping, air compressors, pumps, machinery.

†STEEL PLATE, etc.—**Boston, Mass.**—Sept. 4, by Bureau Supplies & Accounts, Navy Dpt., several tons steel plate; fire extinguishers, protector zincs to Boston Navy Yard.

†IRON SHOULDER BUSHINGS, etc.—**Vicksburg, Miss.**—Sept. 5, by U. S. Eng., Vicksburg, 475 standard black malleable iron shoulder bushings, and 250 iron caps.

†CABLE, etc.—**Brooklyn, N. Y.**—Sept. 21, by Signal Supply Officer, 58th St. and 1st Ave., 24,000 ft. cable and 7 reels.

STORAGE TANKS — **Syracuse, N. Y.** — See "Contracts Awarded."

†CONCRETE CAP, etc.—**Cleveland, O.**—Sept. 7, by U. S. Coast Guard Div., Rockefeller Bldg., 700 ft. concrete cap; 10 c.i. post caps; 500 ft. 4 in. c.i. watermain. P. D. Brody, c/o owner, engr.

†STERILIZER EQUIPMENT, etc.—**Phila, Pa.**—Sept. 19, by Yards & Docks, Navy Dpt., Wash., D. C., sterilizer equipment and piping, Spec. 7744.

CONTRACTS AWARDED

ELECTRIC WELDED STEEL DRIVE PIPE—**Alhambra, Calif.**—City Comn., 1,520 ft. 16 in. and 3,200 ft. 20 in. 12 gage electric welded steel drive pipe lined inside and out with bituminous enamel for Longden Well transmission line, to American Pipe & Steel Co., 230 South Date St., $6,843. Bids Aug. 7, awarded Aug. 15.

PIPE, etc.—**La Verne, Calif.**—City, furnishing pipe and fittings for extensions to water system, to Crane Co., 321 East 3rd St., Los Angeles, $1,433.

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†*Federal Government.*

Materials, etc. (Continued)

CABLE, etc.—Los Angeles, Calif.—City, 16 ga. Latex (or equal) 4/64 lead covered cable, 6,000 ft. 9 conductor and 5,000 ft. 6 conductor, Informal Bid 343, to Westinghouse Electric & Supply, 905 East 2nd St., $1,314.

CABLE—Los Angeles, Calif.—S. A. Joseph, purch. agt., Metropolitan Water Dist., 306 West 3rd St., 20,000 ft. lead covered cable. Bid 26420, to General Electric Co., 5201 Santa Fe Ave., $23,820. Bids Aug. 3, awarded Aug. 15.

ROOFING SHEETS—Los Angeles, Calif.—D. P. Nicklin, purch. agt. Dpt. Water & Power, 207 South Bway., galvanized corrugated steel roofing sheet, Spec. 1468, f.o.b. Los Angeles, to Whiting-Mead Co., 2260 East Vernon Ave., $8,113. Bids Aug. 9, awarded Aug. 21. Noted July 26.

ROAD OIL—Farmersville, Ill.—Montgomery Co., 44,000 gal. road oil at Hillsboro, to C. O. Taylor, Witt, at 5.05c. per gal. Bids Aug. 6.

CRUSHED AGGREGATE—Indiana—State Hy. Comn., Indianapolis, 1,000 tons crushed aggregate at Fort Wayne, to Erie Stone Co., Bluffton, $1,750. Bids Aug. 8.

CRUSHED AGGREGATE, etc.—Indiana—State Hy. Comn., Indianapolis, 750 tons crushed aggregate at Hazelton, to Mid West Rock Products Co., 518 Architects Bldg., Indianapolis, $1,372•••1,500 tons, at Oakland City, to Louisville Cement Co., Speed, $2,415•••2,900 tons, at Medora, to P. Frank, Mount Vernon, $4,031•••500 tons, at Shelburn, to Ohio & Indiana Stone Co., Greencastle, $880•••600 tons limestone screenings, at Medora, to P. Frank, North Vernon, $834. Grand total $9,432. Bids Aug. 14. Noted Aug. 9.

GRAVEL, etc. — Indiana — State Hy. Comn., Indianapolis, 500 tons gravel at Leo, to John Dehner, Inc., Fort Wayne, $800; 750 tons crushed aggregate at Hazelton, to Ohio & Indiana Stone Co., Greencastle, $1,372. Bids Aug. 14. Noted Aug. 9.

TRUCKS—Ames, Ia.—State Hy. Comn., Ames, 2 E54 Coleman trucks, to Coleman Motors Corp., Littleton, Colo., $4,485 each•••5 Oshkosh trucks, to Gibbs Cook Tractor Co., Mason City, $4,075 each•••6 SSUA FWD trucks, to F. W. D. Sales Co., Clintonville, Wis., $4,131 each. Grand total $54,131. Bids Aug. 13. Noted Aug. 9.

ELECTRICAL CABLE—Boston, Mass.—City, Supply Dpt., W. W. Loons, supt., City Hall Annex, furnishing several thousand ft. underground electrical cable to New England Electric Supply Co., Inc., 1249 Tremont St., Roxbury, $6,514. Bids Aug. 1, awarded Aug. 21.

STEEL PIPE—Worcester, Mass.—City, W. Hedlund, supt. P. Buildings, furnishing, delivering 2,000 lin.ft. 8 in. black wrought steel pipe in 20 ft. lengths, for Coes Pond Bathhouse, to Crane Co., Inc., 45 Green St., $95.25 per 100 ft. Bids July 30, awarded Aug. 21. Noted July 26.

PUMPS—Minneapolis, Minn.—City, furnishing, installing 48 gal. boiler feed pump for Bd. Educ., to Healy Ruff Co., 765 Hampden Ave., St. Paul, $1,613. Bids June 15.

†**DREDGE PUMP—Louisville, Ky.**—U. S. Eng., Post Office Box 59, dredge pump diesel engine for Dredge C. B. Harris, to Busch-Sulzer Bros. Diesel Engine Co., 33000 South 2nd St., St. Louis, Mo., $53,300. Bids July 24. Noted July 5.

VALVES, etc.—New Bedford, Mass.—Water Bd., S. Taylor, supt., Municipal Bldg., two 6 in. air valves, to Rensselaer Valve Co., Ontario St., Troy, N. Y., $500•••one 36 in. and four 12 in. gate valves, to Darling Valve Mfg. Co., Williamsport, Pa., $1,002 and $254 respectively •••special castings, to U. S. Pipe & Fdry. Co., Lincoln-Liberty Bldg., Phila., Pa., $150 per ton. **P.W.A.** Bids July 25. Noted July 19.

SEWER PIPE—Worcester, Mass.—City, concrete sewer pipe, to Lock Joint Pipe Co., Ampere, N. J., 27 in. at $2.29 per ft.; 78 in. at $16.95 per ft.

STORAGE TANKS—Syracuse, N. Y.—Standard Oil Co. of New York, 26 Bway., New York, 1,300,000 gal. steel storage tank, at Solar and Bear Sts., separate contracts. To exceed $10,000.

†**REFRIGERATION EQUIPMENT — Norfolk, Va.**—Yards & Docks, Navy Dpt., Wash., D. C., refrigerating equipment in commissary store at Naval Operating Base, Spec. 7726, to Creamery Package Co., 2412 Walnut St., Phila., Pa., $5,900. Bids Aug. 15. Noted Aug. 9.

FOREIGN

Ceylon—Government voted 30,000,000 rupees for telephone extensions and installation of automatic exchange. Tenders in September.

Egypt, Cairo—Sept. 15, by Director of Tansin Dpt., Ministry of Public Wks., supplying 3 flushing cars, 3 heavy trucks, 1 electrical transport car and 1 light truck.

England — Walsall Town Council bids in September, constructing 105 houses, $210,000 •••I. W. Stevens, preparing plans 308 houses, in **Altcar**, $431,200•••Herefordshire Co. Council, **Hereford**, voted $1,000,000 for municipal office addition.

New Zealand, Wellington — Oct. 2, by Director-General Stores Dpt., General Post Office, supplying 25 telephones, No. 164: Oct. 16, for 5,000 cords instrument 4 conductors; Oct. 17, 500 cords instrument 6 conductors; Sept. 18, by Directors Posts & Telegraph Dpt., 5,000 double ended arm bolts for telegraph; Sept. 25, 3,000 galvanized pole steps; Sept. 27, 10,000 swan neck and 30,000 arm bolts.

Siberia, Krasnoyarsk — Commissariat Heavy Industry, Moscow, or c/o Amtorg Trading Corp., 261 5th Ave., New York, plant for dredge building for use in gold recovery, day labor. To exceed $500,000.

Union Socialist Soviet Republics — Jewish Autonomous Territory of Far East, c/o Soviet Government, Moscow, or c/o Amtorg Trading Corp., 261 5th Ave., New York, constructing hotels, community laundry, theatre, and group community buildings at Birobidzhan, in Far Eastern Region, by day labor. Est. about $500,000.

Union Socialist Soviet Republics—Commissariat of Heavy Industry, Moscow, or c/o Amtorg Trading Corp., 261 5th Ave., New York, metal refinery additions at Darasun, Tranbaikal Dist., by day labor. To exceed $500,000.

Union Socialist Soviet Republics — Commissariat Rail Transportation, c/o Soviet Government, Moscow or c/o Amtorg Trading Corp., 261 5th Ave., depots and railway stations by day labor, at Churubay-Nura; Agadir; Burma and Darga as part of Karaganda-Balklash Railway in Kazakstan. To exceed $2,500,000.

PUBLIC BUILDINGS

BIDS ASKED

Calif., San Jose—City Council bids about Sept. 10, 3 story, rein.-con., structural steel civic auditorium, Market and San Carlos Sts. $300,000 or more. Binder & Curtis, 35 West San Carlos St., archts., Leland & Haley, 58 Sutter St., San Francisco, engrs. Noted July 12.

Colo., Pueblo—Sept. 11, by State Hospital for Insane, Dr. F. H. Zimmerman, supt., at State Executive Council, Denver, general contract, heating and plumbing work, for concrete, brick, steel dormitory, $64,000. Part of $400,000 P.W.A. job.

†**D. C., Wash.**—Sept. 5, by National Park Service, Dpt. Interior, 7th floor addition to Dept. Interior Building, 18th and F Sts.

†**D. C., Wash.**—Sept. 20, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing extension to internal revenue building; adv. E.N.-R. Aug. 30.

Md., Skyesville — Springfield State Hospital, bids about Sept. 15, 2 story, basement hospital, $125,000. H. P. Hopkins, 10 West Mulberry St., Baltimore, archt. Noted Feb. 1.

Mass., Chelsea—Sept. 11, by Commonwealth of Massachusetts, W. J. Keville, pres. Trustees, Service Bldg., Soldiers Home, 3 and 4 story, basement, 30x240 ft. brick, granite, cast stone dormitory, concrete found., at Soldiers Home, Crest Ave., P.W.A. Project V-1, Docket 5439. $300,000. Coolidge, Shepley, Bulfinch & Abbott, 1 Court St., Boston, archts. Richardson & Gay, 12 Pearl St., Boston, engrs. Noted May 24.

Mass., Chicopee—Sept. 5, by City, J. J. Desmond, Jr., supt. Schools, installing oil burning heating equipment in Sheridan St., Royal St. and North Chicopee Schools.

Miss., Whitfield—Sept. 10, by State Hy. Impvt. Comn., Jackson, furnishing heating and plumbing facilities, and electric wiring system, and furnishing, installing power generators at the new Insane Hospital. N. W. Overstreet, Jackson, archt.

†**Neb., Grand Island**—Sept. 14, by Treas. Dpt. at office Sup. Archt., Wash., D. C., post office and court house. Noted May 4, 1933.

N. Y., Bayside—Sept. 11, by W. C. Martin, archt. and supt. School Buildings, Flatbush Ave. extension and Concord St., Brooklyn, electrical work and lighting fixtures, heating, ventilating, plumbing and drainage in Bayside High School, 32nd Ave., 32nd Dr., Corporal Kennedy, 208th and 209th Sts., for Bd. Educ., 500 Park Ave., New York.

†**N. Y., Johnson**—Sept. 18, by Treas. Dpt. at office Sup. Archt., Wash., D. C., U. S. Post Office, $56,870; adv. E.N.-R. Aug. 30. Noted May 24.

N. Y., New York—Sept. 7, by W. F. Morgan, Jr., comr. Dpt. P. Markets, Municipal Bldg., constructing 48 merchant stores, restaurant building, comfort station, farmers market sheds and paving at Bronx Municipal Terminal, Exterior and East 150th Sts. Noted Aug. 23.

†**W. Va., Parkersburg**—Sept. 7, by Treas. Dpt. at office Sup. Archt., Wash., D. C., remodeling, except elevator, U. S. Court House; adv. E.N.-R. Aug. 30. Noted Sept. 21, 1933.

CONTRACTS AWARDED

†**Calif., Fort Mason**—Con. Q.M., altering finance building, to H. J. Oser, 1118 Hobart Bldg., San Francisco, $7,444. Bids Aug. 16.

†**Calif., March Field** — Con. Q. M., ordnance magazines, to DeCamp Hudson Co., 1277 West 24th St., Los Angeles, $8,841. Bids July 24.

†**Calif., San Diego**—Yards & Docks, Navy Dpt., Wash., D. C., dolphins and floats for dredged area for floating dry dock, Spec. 7771, to M. H. Golden, 404 Calif. St., $22,040. Bids Aug. 21 •••brick settings for two existing boilers at Fuel Depot, to R. G. Meyler Corp., 408 South Spring St., Los Angeles, $5,950. Bids Aug. 16 •••distribution lines, Air Station, to E. C. Nickel, 912 Michelorena St., Los Angeles, $29,790. Bids Aug. 22•••altering Building 1, fuel depot, to Brock Building Co., 4265 Ethelda Pl., $2,547. Bids Aug. 16. Grand total $30,337. Noted July 26.

Calif., San Mateo—Trustees of San Mateo High School Dist., additions to San Mateo High School and Applied Arts Building, and additions to Burlingame High School, to C. L. Wolf, 412 Fulton St., San Francisco, $216,507. **P.W.A.** Bids Aug. 6, awarded Aug. 19. Noted July 26.

†**Ind., Hartford City**—Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office, to Dunlap & Co., Columbus, Ind., $37,949. Bids Aug. 14. Noted Aug. 2.

†**La., New Orleans**—Treas. Dpt. at office Sup. Archt., Wash., D. C., furnishing, replacing skylights and ornamental globes over pavilions on roof at Post Office and court house, to Blottman-Weeser Sheet Metal Wks., Inc., 1001 Toulouse St., $8,530. Bids July 20, awarded Aug. 11.

†**Md., Baltimore**—Treas. Dpt. at office Sup. Archt., Wash., D. C., nurses quarters at U. S. Marine Hospital, to M. A. Long Co., 10 West Chase St., $101,000. Bids Aug. 10.

†**Mont., Babb-Piegan**—Treas. Dpt. at office Sup. Archts., Wash., D. C., completing construction inspection station, to McGinnis & Lancaster, Browning, $4,280. Bids June 19. Noted May 31.

N. J., Totowa—Dpt. Institutions & Agencies, State Office Bldg., Trenton, general contract dormitories, P.W.A. 48, to Reliable Constr. Co., Grantwood, $53,931•••plumbing, to Jachnig & Peoples, Inc., 233 13th St., Newark, $7,485••• structural steel, to Albert Smith, 298 Conit St., Irvington, $6,197•••general contract detention building, P.W.A. 47, to L. Auriema, 1765 Boulevard, Jersey City, $38,165•••plumbing, to A. Arace & Sons, 642 3rd Ave., Elizabeth, $6,697•••structural steel, to Breen Iron Wks., 272 Badger Ave., Newark, $8,025•••heating for both projects, to G. J. Tobin, 187 North Ave., Plainfield, $10,939 and $7,727 respectively•••electrical work, to Badaracco & Co., 107 Bloomfield Ave., Newark, $2,510 and $2,130 respectively•••underground steam conduit, to H. W. Porter & Co., 825 Frelinghuysen Ave., Newark, $3,224 and $962 respectively. Grand total $147,992. **P.W.A.**

N. J., Skillman—Dpt. Institutions & Agencies, State Office Bldg., Trenton, general contract dormitories, to Pellechia Constr. Co., 50 Branford Pl., Newark, $204,000•••plumbing, to Jachnig & Peoples, 221 3rd Ave., Newark, $35,682•••heating, to G. Stewart, Newark, $32,459•••electrical work, to Brown Electric Co., 10 New Jersey Ave., Trenton, $11,000•••structural steel, to N. A. K. Bugbee, 206 East Hanover St., Trenton, $25,983•••outside sewers and water lines, to J. Jingoli & Son, Trenton, $4,255. Grand total $313,379. **P.W.A.** Noted Aug. 31.

N. Y., Cold Spring—Bd. Educ. Putnam Valley School Dist. 1, heating and ventilating for school, to D. J. Rice, Inc., 4150 38th St., Long Island City, $35,615•••plumbing, to J. Winkel, 148 Larchmont Ave., Larchmont, $15,936••• electrical work, to H. Z. Altberg, Inc., 1776 Bway., New York, $14,165. Grand total $65,716. **P.W.A.** Bids July 21. Noted Aug. 23, under "Contracts Awarded."

N. Y., Delhi—Commissioner Educ., Education Bldg., Albany, heating, boilers and pumping equipment at New York School of Agriculture, to H. Sand & Co., 158 Greene St., New York, $4,485. Noted Aug. 2.

N. Y., Orangeburg — Dpt. Mental Hygiene, State Office Bldg., Albany, heating at Rockland State Hospital, to Dierks Heating Co., Inc., 210 East 31st St., New York, $43,497. Bids July 25.

N. Y., Orangeburg — Dpt. Mental Hygiene, State Office Bldg., Albany, general contract infirmary building north wings, single female employees' building, service tunnels at Rockland State Hospital, to Miller & Gaynor Co., Overocker Rd., Poughkeepsie, $366,900•••heating, to H. Starkman & Bros., 132 Brook Ave., New York, $26,270•••sanitary work, to Worsfold & Hawvermale Inc., 140 Main St., Nyack, $23,984•••electrical work, to Rao Eng. Co. Inc., 370 Lexington Ave., New York, $15,450 •••electric elevator, to Otis Elevator Co., 1877 Webster Ave., New York, $38,719•••special electric fixtures, to Ferro Art Co., Inc., 406 West 31st St., New York, $248•••refrigeration work, to York Ice Mchy. Corp., 42nd St. and 2nd Ave., New York, $13,360. Grand total $484,931. General contractor awarded contract over 500 tons structural steel, to Belmont Iron Wks., 22 and Washington Sts., Phila., Pa. Contracts awarded latter part of July. Noted May 24.

N. Y., Poughkeepsie — Commissioner Dpt. Mental Hygiene, State Office Bldg., Albany, general contract heating plant addition, to Silbertblatt & Lasker, 25 West 45th St., New York, $32,300•••heating, to Afco Eng. Co., 142 Fulton St., New York, $63,853•••sanitary work, to Hubbard & Lange, 70 East 45th St., New York, $1,187•••electrical work, to Goodrich Electric Installation Co., 166 Lexington Ave., New York, $38,921. Grand total $136,241. Bids July 11. Noted June 28.

Mass., Harding—Commonwealth of Massachusetts, Dpt. Mental Diseases, State House, Boston, boilers for power plant alterations and additions at Medford State Hospital, to Erie City Iron Wks., 25 Huntington Ave., Boston, $10,400•••stokers, to Detroit Stoker Corp., 141 Milk St., Boston, $4,300. **P.W.A.** Bids July 17, awarded Aug. 10. Noted July 26.

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†*Federal Government.*

Public Buildings (Continued)

†**N. Y., New York**—Federal Reserve Bank of New York, 33 Liberty St., bank and office addition, Maiden Lane, William and Liberty Sts., to Marc Eidlitz & Son, 100 East 42nd St., New York. Est. $800,000. Contractor now taking bids on separate contracts. Noted July 26.

O., Springfield—Service Director, pipe, circulators, etc. for municipal light plant, to Simon Small & Son, Mansfield, $18,214; additions to generator, etc., to Kelso-Wagner Co., $11,950. P.W.A.

†**Ore., Astoria**—Yards & Docks, Navy Dpt., Wash., D. C., waterproofing and plastering dormitory at Naval Radio Station, to Mart & Co., Astoria, $445. Bids Aug. 20.

Pa., Harrisburg—Mehring & Hanson, general contractors, 162 North Clinton St., Chicago, Ill., air conditioning equipment for air-conditioning system for House and Senate Chambers, to York Ice Mchy. Co., York, Pa., and 2nd Ave. and 42nd St., Brooklyn, N. Y. Noted Aug. 2, under "Contracts Awarded."

†**Va., Norfolk**—Yards & Docks, Navy Dpt., Wash., D. C., extending Building 163, to Hughes-Foulkrod & Co., 809 Schaff Bldg., Phila., Pa., Items 1 and 5, $609,500. Bids Aug. 22. Noted Aug. 2.

†**Wash., Seattle**—Superintendent Lighthouses, Seattle, constructing power house and fog signal building at lighthouse station at Neah Bay, to Livhus & Owley, 907 North 47th St.

Ont., Ottawa—Ottawa Hydro-Electric Comn., Bank St., structural steel for office building, to Dominion Bridge Co. Ltd., Ottawa; reinforcing bars and bar joists, to Dominion Reinforcing Co., 396 Somerset St. Noted Aug. 2, under "Contracts Awarded."

Ont., Toronto—J. Wilde Co. Ltd., 10 Dunklin St., Toronto, power plant equipment and plumbing, to Purdy Mansell Ltd., 63 Albert St.••• heating and ventilating, to Bennett & Wright Ltd., 72 Queen St., East Toronto•••boilers and stokers, to J. Inglis Co., Ltd., 14 Strachan Ave., for Western Hospital, 391 Bathurst St. Noted July 12, under "Contracts Awarded."

Que., Montreal—Dpt. P. Wks., Ottawa, Ont., constructing postal terminal building, to Duranceau & Duranceau, 5847 Hamilton St., $1,443,692. Bids Aug. 10, awarded Aug. 20. Noted July 12.

COMMERCIAL BUILDINGS

PROPOSED WORK

Mass., Holyoke—J. W. Donohue, archt., 1200 Main St., Springfield, soon lets contract reconstructing 2 story, basement, brick, stone church, for St. Jerome Church, J. F. Fagan, pastor, 169 Hampden St., Holyoke. Noted June 14.

N. J., Roselle—A. F. Durang, archt., 238 East 47th St., New York, soon lets contract, constructing church for St. Joseph's Church, G. E. Murphy, pastor, 154 East 3rd St. $200,000. Noted Aug. 9.

N. Y., Astoria—Halletts Cove Garden Homes, Inc., c/o P. Grimm, 350 Madison Ave., New York, has had $2,975,000 P.W.A. allotment rescinded. Project indefinitely in abeyance. Noted Sept. 28, 1933, under "Contracts Awarded."

N. Y., New York—H. I. Feldman, archt., 15 West 44th St., bids after Sept. 1, on separate contracts elevator, plumbing, heating, etc., for 3 story, store and apartment, 44 East 7th St., for Forty-Four East 7th Street Corp., S. M. Baum, pres., 111 2nd Ave. $35,000. Noted Aug. 16.

BIDS ASKED

Calif., Salinas—F. Meyer, archt., 525 Market St., San Francisco, taking bids theatre, office, 50x100 ft. rein.-con. auditorium, 600 seating capacity, Sausal St., for Peters & Borg, c/o architect.

N. Y., Brooklyn—See "Contracts Awarded."

N. Y., New York—See "Contracts Awarded."

CONTRACTS AWARDED

Conn., Bridgeport—H. C. Elton, archt., 1188 Main St., 1 story, 100x200 ft., granite, brick store, Fairfield Ave., for Yale University, W. M. Hotchkiss, 205 Church St., New Haven, to E. & F. Constr. Co., 94 Wells St., $128,000. Bids Aug. 16, awarded Aug. 18. Noted Aug. 23.

Conn., Hartford—G. Fox & Co., 970 Main St., sub contracts for interior alterations and improvements to large department store, metal furring, asbestos board acoustic tile, to F. E. Perry, Jr. & Co., Inc., 50 Trumbell St., $12,500; concrete piers, to Foundation Co., 120 Liberty St., New York, $8,400. Noted Jan. 25, under "Contracts Awarded."

Mass., South Hadley—Mount Holyoke College, M. E. Woolley, pres., general contract 3 story, basement, 68x113 ft., brownstone library addition, concrete found., at Mount Holyoke College, to E. J. Pinney Co., Inc., 220 Dwight St., Springfield. Est. exceeds $105,000. Bids Aug. 7, awarded about Aug. 15. Noted July 26, under "Public Buildings."

Mass., Springfield—Fox Theatres Corp., 444 West 56th St., New York, constructing brick, steel theatre and office building, Main St., to J. Pollack, 234 West 55th St., New York. Est. exceeds $250,000. Noted June 11.

Mo., Kirkwood—Selden-Breck Constr. Co., general contractors, Fullerton Bldg., St. Louis, excavating for 3 story, basement, 40x200 ft., brick, steel, concrete home for aged, for Carmelite Sisters of Divine Heart of Jesus, Manchester Rd. and Woodlawn Ave., Kirkwood, to J. E. Connelly Excavating Co., 481 Rosedale Ave.•••stone work, to Reitz Bros. Stone Co., 4421 Race Course Ave.•••brick work, to Sauerbrunn Constr. Co., 1540 South Vandeventer Ave. •••concrete and cement work, to H. A. Dailey, Inc., 4108 Clayton Ave.•••millwork, to F. Schmidt Planing Mill Co., 2736 Victor St.•••structural steel, to LaSalle Iron Wks., 3110 LaSalle St.•••plumbing, to Corrigan Co., 2501 West St. Louis Ave.•••heating, to Strong Heating Co., Chemical Bldg.•••electrical work, to Hesse Schaeffer Electric Co., Inc., 921 Baden Ave.•••slate roofing, to G. A. Riddle & Co., 1007 South Theresa Ave.•••plastering, to G. F. Robertson Plastering Co., 3928 West Pine Blvd. Total cost approximately $150,000. Noted Aug. 23, under "Contracts Awarded."

N. J., Union City—St. Michael's Passionist Monastery, D. O'Rourke, pastor, 381 West St., general contract stone church, to McMahon & McTagert, 40 East 49th St., New York. Est. about $500,000. McGinnis & Walsh, 20 Providence St., Boston, Mass., archts.

N. Y., Brooklyn—J. Halpern, 685 Crown St., 6 story apartment, Ocean Ave. and Gravesend Neck Rd., separate contracts, $185,000. Kavy & Kavovitt, 16 Court St., archts. Noted Aug. 16.

N. Y., Brooklyn—P. Lipoff, 1045 St. Johns Pl., 6 story, 90x100 ft., apartment and store, separate contracts, $175,000. Kavy & Kavovitt, 16 Court St., archts. Noted Aug. 16.

N. Y., Brooklyn — Union Savings Bank of Williamsburg, 207 Havemeyer St., incinerator, heating for 6 story apartment, South 3rd and Havemeyer Sts., separate contracts. Est. $30,000. Noted Aug. 16

N. Y., New York — New York Society for Relief of Ruptured & Crippled, 315 East 42nd St., 2 story, top addition to hospital, to Marc Eidlitz, 100 East 42nd St. Est. $100,000. Noted Aug. 16.

N. Y., New York—Bank of New York Trust Co. for Florence Fish Estates, 48 Wall St., air conditioning and heating in 13 story apartment, 810 5th Ave., to Barr, Irons & Lane, 420 Lexington Ave. Est. $28,000 or more. Noted Aug. 16.

N. Y., New York—Berge Estates, Inc., 161 East Gun Hill Rd., S. Derfner, altering heating, plumbing in apartment, 482 Central Park West, separate contracts, $75,000 or more. I. L. Crausman, 332 East 149th St., archt. Noted Aug. 16.

N. Y., New York—A. Britt, 441 East 57th St., heating, plumbing, elevators, incinerators for store and apartment, 434 East 58th St., separate contracts now being awarded. To exceed $28,000. S. W. Katz, 527 5th Ave., archt. Noted Aug. 16.

N. Y., New York—Eldisch Corp., E. C. Conley, pres., 247 Park Ave., altering heating and plumbing in three 4 story apartments, 413 East 86th St., to Martin L. Wiener, 220 East 42nd St. Est. $28,000 or more. Noted Aug. 16.

N. Y., New York—One Hundred Fifty Two-Second Ave. Corp., S. Drecktor, pres., 12 East 41st St., heating, plumbing alterations in two 4 story apartments, 152 2nd Ave., separate contracts. To exceed $28,000. Owner taking bids. A. Weiser, 120 East 41st St., archt. Noted Aug. 16.

N. Y., New York—W. Pollak, 971 1st Ave., altering heating, plumbing in apartment, 971 1st. Ave., separate contracts. $28,000. Inserro & Pollak, 971 1st Ave., archts. Noted Aug. 16.

N. Y., New York—Spaulding Realty Corp., M. Shroeder, pres., 295 Madison Ave., altering heating, new incinerators, elevator work for 6 story apartment, 12 West 93rd St., to Shroeder & Kopell, 295 Madison Ave. Est. exceeds $28,000. Noted Aug. 16.

INDUSTRIAL BUILDINGS

PROPOSED WORK

N. Y., Brooklyn—MARKET—Wolk Glick, Inc., 757 Crown St., will award contract about Sept. 1, from bids submitted by selected list bidders for meat and produce market, Johnson Ave. and East White St. To exceed $28,000. Noted Aug. 16.

O., Cleveland—FACTORY—Wilbur Watson & Associates, engrs. and archts., 4614 Prospect Ave., soon lets contract altering 6 story, basement, factory, 1974 East 61st St., for Case School of Applied Science, Euclid Ave. $80,000.

BIDS ASKED

Ind., Lawrenceburg — DISTILLERY — See "Contracts Awarded."

N. Y., Greig—POWER PLANT—See "Contracts Awarded."

N. Y., New York—LAUNDRY—Chelsea Moore Corp., R. LeRoy, pres., bids about Jan. 1, laundry, 528 West 24th St. $40,000. P. C. Hunter, 168 West 23rd St., archt. Noted Aug. 16.

CONTRACTS AWARDED

Calif., Huntington Beach—ABSORPTION PLANT—O. C. Field No. 4, 6 new compressors, 200 hp. each, will be installed in plant, 20th and Acacia Sts., to Fluor Constr. Co., Box 1728, Station K, Los Angeles. Est. $50,000. Noted Dec. 14.

Calif., San Dimas—LEMON STORAGE—San Dimas Lemon Assoc., additions to lemon packing hous. incl. 1 stocy, 32x40 ft. rein.-con. compressor building, 106x130 ft. insulation and refrigeration basement, storage. Owner builds. $40,000. Grant & Bruner, Ltd., 607 Ferguson Bldg., Los Angeles, engrs. and archts.

Calif., Santa Rosa—MEAT PACKING PLANT—Santa Rosa Meat Packing Co., brick, rein.-con. additions, to H. Bunyan, 724 Washington St., cost plus (exceeds $40,000 with equipment.) Noted July 26.

Colorado—ORE MILL and SMELTER—Mineral Machines, Inc., H. H. Nicholson, pres., 2800 Spruce St., Boulder, or c/o Miller-Murray Co., 444 Madison Ave., New York, mill and smelter, near Boulder. Owner financing by stock issue and will build by separate contracts. To exceed $50,000. Noted Aug. 16.

Conn., Hartford—FACTORY—Hartford Empire Co. 347 Homestead Ave., 2nd story, 100x155 ft., brick, steel addition to engineering department, Homestead Ave., to R. B. Swain, 75 Bloomfield Ave., $71,480.

Ga., Elberton—SAND PLANT—Seaboard Air Line, W. D. Faucette, ch. engr., Norfolk, Va., constructing fireproof, overhead storage, automatic electric locomotive coaling plant and standing plant, to Ross & White Co., Chicago, Ill.

Ga., Valdosta—STORAGE—Georgia & Florida R.R., Valdosta, 250,000 gal. storage plant, separate contracts awarded, Turpentine & Rosin Factors, Inc., Valdosta, lessees. To exceed $40,000.

Ind., Lawrenceburg — DISTILLERY — J. E. Seagram & Sons, Lawrenceburg, distillery, separate contracts, to exceed $250,000; stills, to Ansonia Copper & Iron Wks., 621 Evans St., Cincinnati, O., to exceed $30,000.

Ia., Bloomington — WAREHOUSE — Illinois Central R.R. Co., A. F. Blaess, ch. engr., 135 East 11th Pl., Chicago, Ill., constructing 40x80 ft. warehouse, to Zittrell-Mills Co., Fort Dodge.

Mass., Erving—PAPER MILL—Erving Paper Mills, M. Housen, mgr., 1 story, basement, 80x80 ft. brick, steel addition, concrete found., to P. J. Kennedy, Jr., Smiths Ferry. Est. $105,000. Work started. Noted Sept. 14.

Mich., Dearborn—STEEL MILL—Ford Motor Co., Schaefer Rd., 84 in. cold strip mill for River Rouge plant, to United Eng. & Fdry. Co., 1st Natl. Bank Bldg., Pittsburgh, Pa., $400,000; 110,000 kw. generator and electrical equipment, to General Electric Co., River Rd., Schenectady, N. Y., and other electrical equipment for Dearborn Power Plant, to Westinghouse Electric Mfg. Co., 30 Rockefeller Center, New York, est. $5,500,000.

N. Y., Conesus—PLANT—O-Neh-Da-Vineyard & Distillery Co., Conesus, or c/o Financial Security Corp., 521 5th Ave., New York, reconditioning plant, separate contracts now being awarded. To exceed $80,000. Noted Aug. 16.

N. Y., Greig—POWER PLANT—New York Utilities, Inc., Greig, electric power plant with distribution lines, here and Lewis Co., separate contracts. To exceed $30,000. Project authorized by Pub. Service Comn.

N. Y., New York — FACTORY — Emigrant Industrial Savings Bank, 51 Chambers St., replacing boilers in factory, 170 Crosby St., to Wolff & Munier, Inc., 222 East 41st St. Est. $28,000. Noted Aug. 16.

N. Y., New York—STORAGE—Estate of O. Goelet, c/o Carstens, Linnekin & Wilson, 221 4th Ave., storage and distribution building, 1 Worth St., to McAndrew Constr. Co., 12 East 41st St. Est. $60,000. Jaburg Bros., 1 Worth St., lessee. Scott & Prescott, 34 East 23rd St., archt. Noted Aug. 16.

O., Cleveland—WAREHOUSE—Walter Nathan, rebuilding 3 story, 60x130 ft., brick, timber, 6023 Cedar Ave., to Dunbar Co., 8201 Cedar Ave. Est. $30,000. Awarded Aug. 17.

O., Columbus—FACTORY—Farmers Fertilizer Co., Windsor Ave., 1 story, 110x300 ft., frame factory. Windsor Ave., to E. L. Prentice, 77 East Longview Ave., about $52,000.

O., Minerva — TUNNEL KILNS — Cronin Pottery Co., constructing 4 new tunnel kilns, incl. necessary buildings to house new units, to Ladd Cronin Eng. Co., Columbus, O., and New Cumberland, W. Va. Est. $150,000. Noted July 26.

Pa., Broad Fork—STORAGE, etc.—O. Overholt & Co., R. C. Berry, mgr., storage and distribution building addition, to Sanderson & Porter, 52 William St., New York. Est. $750,000. Noted Mar. 1.

Pa., Marcus Hook—PLANT ALTERATION—Congoleum-Nairn, Inc., altering plant, to Turner Constr. Co., Graybar Bldg., New York. Est. $50,000 or more. Noted Dec. 7.

†*Federal Government.*

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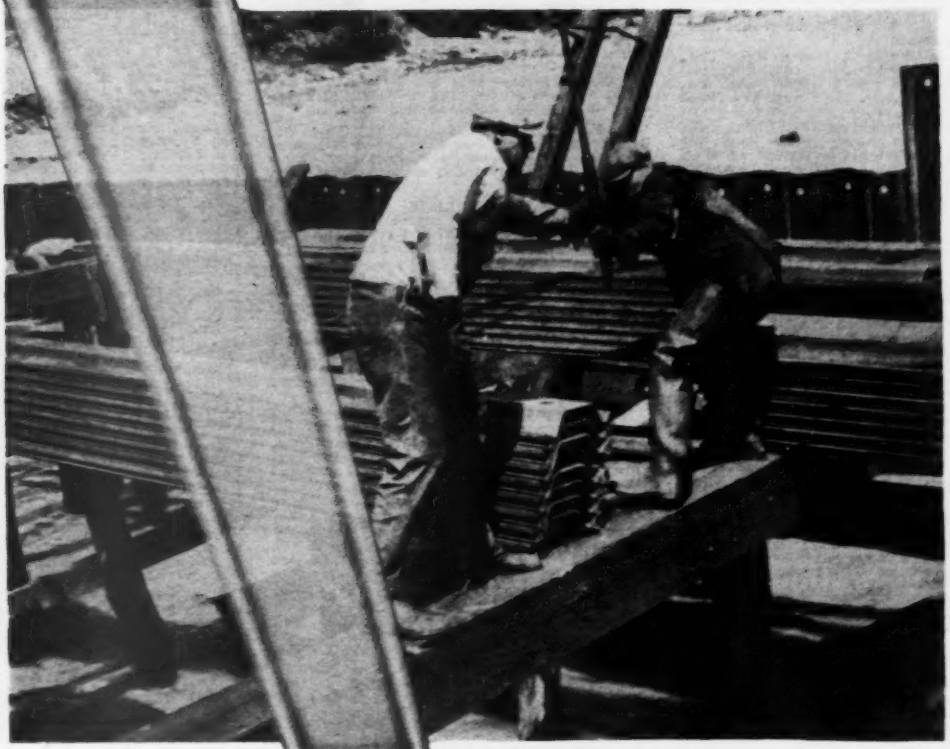

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